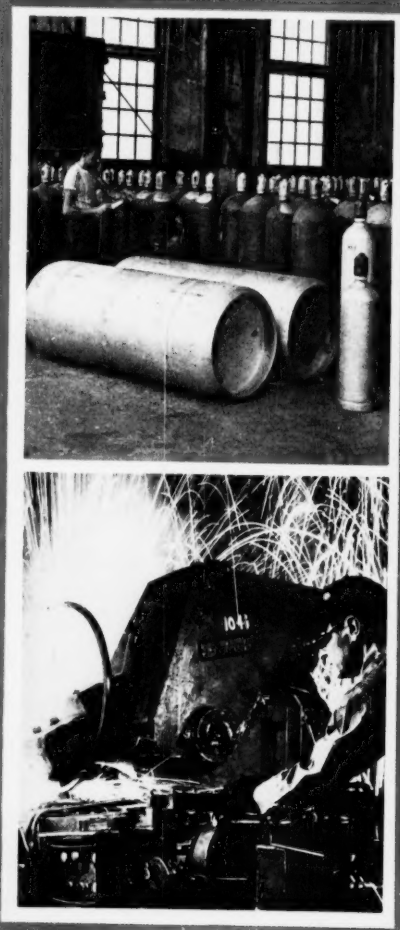
Chemical Week

December 8, 1951 Price 35 cents



40,000 containers; Pennsalt's slick system licks a double problem: keeping track, getting them back ..... p. 14

Methionine heads for "big time"; research uncovers hefty market potential ..... p. 21

Military gobbles titanium at any price, but the plum will be civilian sales; hence: process scurry . p. 27

Many-faceted synthetic latices find myriad uses; now they're a real threat to leather ..... p. 33

Whopping chlorine expansion spotlights tough question: Who'll buy all the caustic? ..... p. 44

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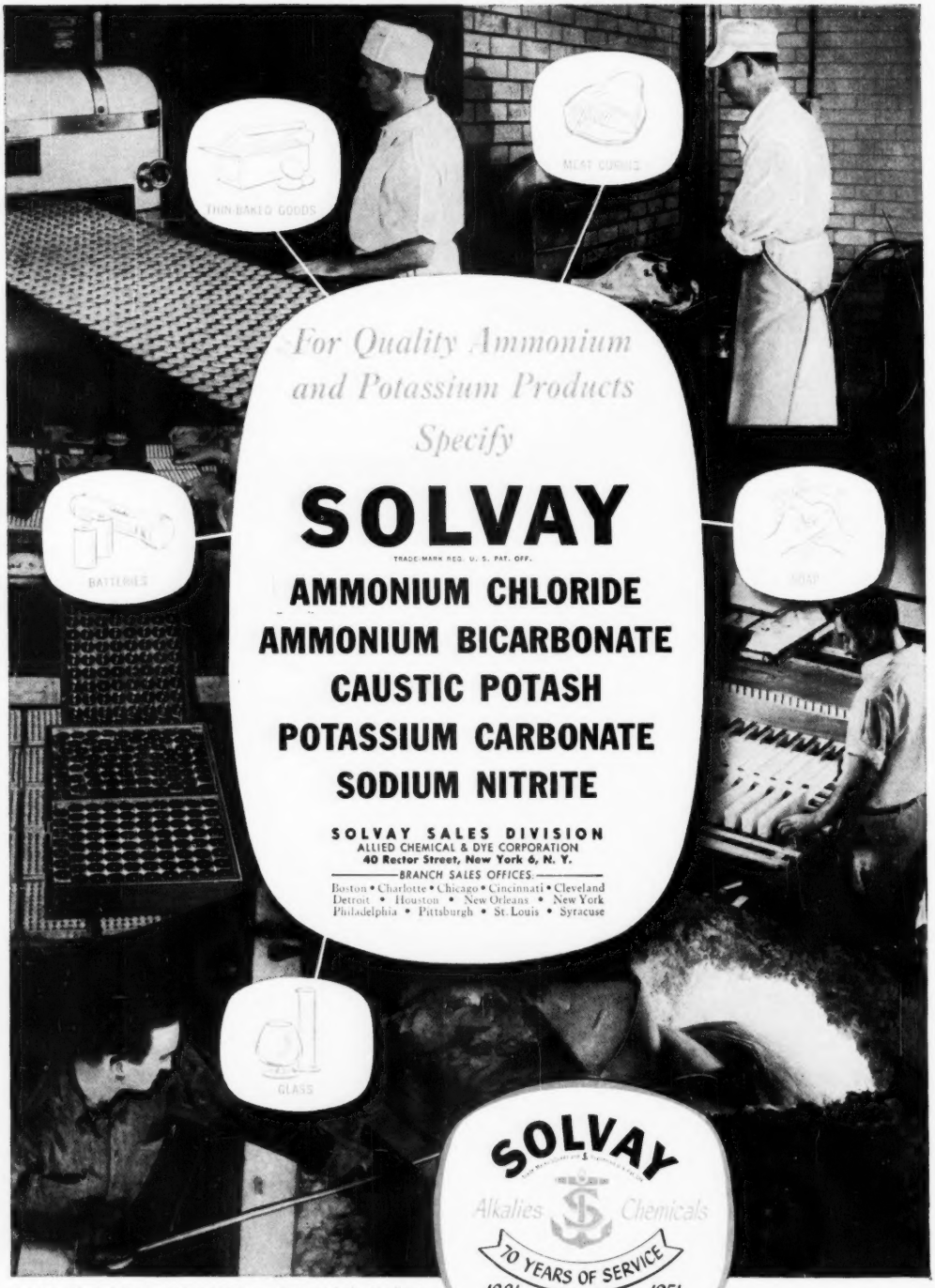

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Chemical Week

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OPINION . . . . . .

Hassle Hassel

To THE EDITOR: . . . I've read several letters from your readers about your use of the rather queer word "hassle" . . . which you admitted wasn't in the dictionary but which you said means "violent argument" . . .

Now you've complicated it all. In your issue of Nov. 24 you had an article entitled "Bleach Hassel." Don't you think you should make up your mind just how to spell it . . .

WRAY BODRIN
Tulsa, Okla.

Caught us, Reader Bodrin. Right now there's quite a hassle raging among CW's editors about how to spell hassel. —ED.

Pay Shortage

To THE EDITOR: Your remarks ("Manpower: Shorter Still," Nov. 24) attributing the shortage of technical manpower to the shortage of pay which that manpower is receiving certainly hit the nail on the head.

Though the fact should be obvious . . . I have never seen it published anywhere so concisely . . . except possibly in letters by irate readers. Your publication is a shining example . . .

EDWARD J. STEVENS
Montclair, N. J.

In analyzing the Defense Mobilization study of technical manpower shortage, CW did not, of course, say that the level of technical salaries was the whole reason, did submit that the ODM had skirted that problem . . . which is one of special moment in boom periods. One reason: fat wages paid ordinary labor discourage college enrollment. Probability: technical salaries will have to be upped to boost the incentive to invest in study. —ED.

Eucalyptus Rayon

To THE EDITOR: . . . In your Oct. 27 issue . . . you say that "in Spain the fledgling rayon industry is seriously considering the use of plentiful local eucalyptus trees for dissolving pulp."

It would have been more exact to say that for the last fourteen months the Spanish rayon industry has been using dissolving pulp made in Spain from local eucalyptus trees. This dissolving pulp is produced at the rayon mill of SNIACE (Sociedad Nacional Industria Aplicaciones Celulosa Espanola, Madrid) located at Torrelavega (Santander).

Many thousand tons of dissolving eucalyptus pulp have already been transformed in rayon fiber . . . several thousand acres of land have been planted with eucalyptus. All this development has been made in close collaboration with Snia Viscosa, Milano (Italy).

FRANCISCO BUSTELE
Madrid, Spain

For rounding out our report on Spain's activities in rayon pulping, CW's thanks. "Fledgling" was ill-chosen if it connoted anything except "young." —ED.

Young Man's Energy

To THE EDITOR: Chemical Week of Nov. 17th carries an article on chemical unionization entitled "Progress and Paradox".

Mr. H. A. Bradley's picture appears and you go on to state that "he is 78 year old . . . his energy is that of a younger man." I can assure you that Mr. Bradley [president, AFL International Chemical Workers] is still in his fifties, and that his energy *is* that of a younger man.

BRADLEY: Deduct 21.

I would also like to state that Mr. Bradley is one of the most business-like union executives I have ever met.

E. BLOCK
Blockson Chemical Co.,
Joliet, Ill.

Union executive Bradley's politeness trapped CW. Introduced at an A. I. Ch.E. meeting a few months ago as "78 years of age" he didn't correct the toastmaster. His real age: 57. One of his executive attributes mentioned in the CW story "his homespun earnestness."—ED.

One, Two, Three

To THE EDITOR: Pertaining to your article in the issue of Nov. 10, entitled,

Wyandotte Chemicals
REG. U. S. PAT. OFF.

DEVELOPMENT NEWS

NEW PLURONICS HAVE WIDE RANGE OF APPLICATION

Four Now Available . . . Controlled Hydrophobic Action Offers Other Future Possibilities

The Pluronics, a series of nonionic surface active agents recently developed by Wyandotte, embrace a group of products that offer properties of superior detergency and complete rinsability.

Four Pluronics are now available. Many others of varying molecular weight, given any hydrophobic-hydrophilic ratio, can be developed to meet requirements exactly.

Three of the Pluronics are liquid — Pluronic L44, Pluronic L62 and Pluronic L64. The fourth, Pluronic F68, is a free-flowing flake. All contain 100% active agent and have no diluent or filler. In a test of acute oral toxicity and acute intravenous toxicity, Pluronic F68 has been found to have a relatively low order of toxicity.

Pluronics Outstanding in These Applications

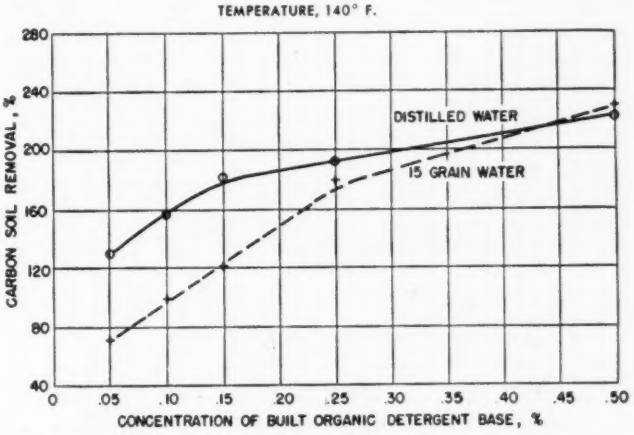
Textiles. In the manufacture of all fabrics—wool, cotton, silk and synthetics—the Pluronics have shown their usefulness in applications of kier boiling, desizing, boiling off, scouring, lanolin recovery, size removal and many others.

Plasticizers. Outstanding among surface active materials for this application, the Pluronics are also suitable plasticizing agents for phenol formaldehyde and low molecular weight polystyrene resins.

Formulated Detergents. Field evaluations indicate that the Pluronics will distinguish themselves in detergents for use in mechanical dishwashing, general dairy cleaning, detergent sanitizers, home laundry, location rug cleaning, and as a scouring powder and detergent sanitizer.

Dentifrices. Virtually tasteless and relatively non-toxic, Pluronic F68 is a unique nonionic detergent that has fine possibilities in toothpaste and tooth powder formulations.

EFFECT OF CONCENTRATION ON CARBON SOIL REMOVAL PROPERTIES OF BUILT ORGANIC DETERGENT BASE. 30% ORGANIC DETERGENT BASE (40% PLURONIC F68 – 40% KREELON 4D – 20% CARBOSE D) + 45% SODIUM TRIPOLYPHOSPHATE + 25% SODA ASH.



• Here is one of many successful uses of Pluronic F68. It shows how a free-flowing organic detergent base may be used in the development of a completely built detergent. The effect of concentration on the detergency properties of this composition was studied in both distilled and hard water over a range to include typical use concentrations. Whiteness retention values were 200% or greater at all concentrations above 0.05%. Results of carbon soil removal tests in distilled and 15-grain water are graphed above.

Wyandotte
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• DEVELOPMENT
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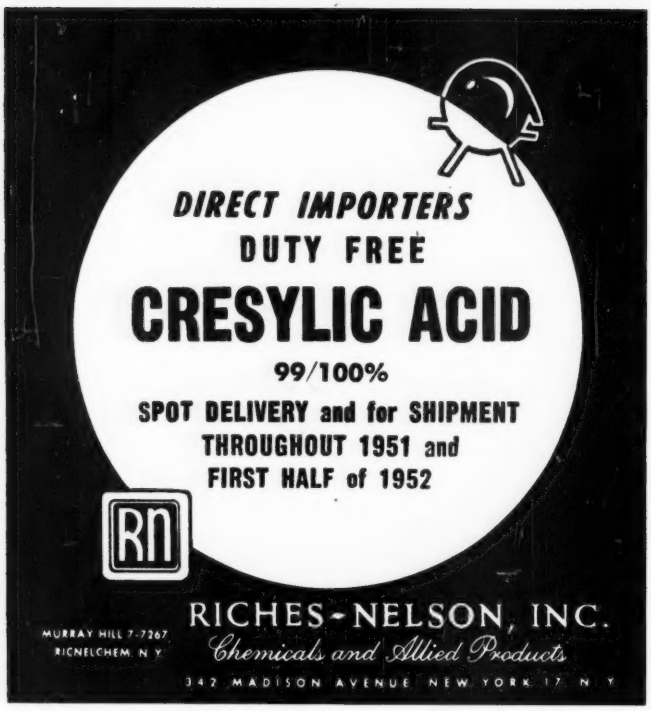

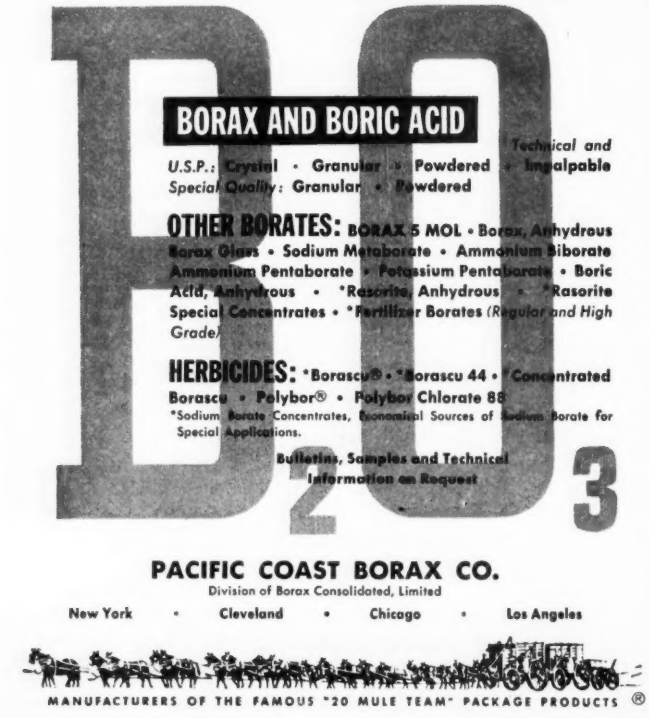
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OPINION . . . . . .

"Dock Snarl Hits Chemicals", you refer to Royce Chemical Co. as a "smaller" producer of sodium hydrosulphites. May we respectfully remind you that Rohm & Haas holds first place, Royce Chemical Co. and Du Pont holding alternately second place . . . each having about the same production.

Will you please correct your article . . . since many of our customers call upon us by reason of our large production and, consequently, your reference is damaging to us in the trade.

HOWARD C. ROYCE
Vice President, Sales
Royce Chemical Co.
Carlton Hill, N. J.

CW regrets its ambiguous phrasing, gladly clarifies the rank of sodium hydrosulfite producers.—ED.

Ample Allethrin

TO THE EDITOR: In your issue of Nov. 17 we note with interest the difference of opinion existing between NPA and resorcinol manufacturers regarding the availability of that item. We also enjoyed the careful language of your chemical markets editor (in the Sept. 15 issue), describing the very short supply of a number of items as being "by NPA standards."

These news items highlight our own position of having ample stocks, in spite of a cutback production schedule, to take care of all the allethrin market we can find.

In spite of our having successfully taken care of all prime contractors' demands for allethrin in military formulations and at the same time sold respectable civilian amounts, we continue to find allethrin under the Inventory Control Regulation of Priority Reg. 1 and in Group 1 in the NPA Guide to Purchasing.

The apparent multiplicity of this type of occurrence sometimes makes one wonder whether there may not be some "behind the scenes" finagling to keep these items in classifications in which they do not belong.

C. A. CLARK
Vice President & General Manager
McLaughlin Gormley King Co.
Minneapolis, Minn.

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

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$$CNCH_2CONH_2 + 2H_2 \xrightarrow{\text{catalyst}} \underset{\text{amide of } \beta\text{-alanine}}{NH_2CH_2CH_2CONH}$$

DEHYDRATION

$$CNCH_2CONH_2 \xrightarrow{\text{catalyst}} \underset{\text{malononitrile}}{CNCH_2CN} + H_2O$$

CONDENSATIONS

$$2CNCH_2CONH_2 + \underset{\substack{\text{ketone or}\\ \text{aldehyde}}}{RR'C=O} \xrightarrow{\text{catalyst}} \underset{\substack{\text{substituted}\\ \text{piperdine}}}{RR'CCH(CN)CONHC(=NH)CHCONH_2} + H_2O$$

$$CNCH_2CONH_2 + \underset{\text{diketone}}{RCOCR'HCOR''} \xrightarrow{\text{catalyst}} \underset{\substack{\text{substituted}\\ \text{pyridone}}}{RC=C(CN)CONHCR''=CR'} + 2H_2O$$

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NEWSLETTER

If you haven't decided whether to price your products (petrochemicals, superphosphate, certain other chemicals) under the General Ceiling Price Regulation or CPR-22X, don't worry about a deadline.

Office of Price Stabilization has granted an indefinite extension. Its reason: to save manufacturers reams of tedious paperwork—since these items are slated to come under tailored price ceilings in any case.

Another delay—this time in the Defense Production Administration—concerns dollar amounts on certificates of necessity. Several went through the mill and were granted, the sums involved to be settled later.

Now both DPA and NPA are so busy on urgent programs—e.g., machine tools—that they won't have a chance to look at the certificates until early next year. And decisions won't be forthcoming until spring.

Reason: DPA foresees a lot of haggling with individual firms; and the many determinations of fact, many submissions of sworn statements, etc., will consume weeks and months.

But when the amounts are fixed, they'll be announced publicly.

NPA met with several industry groups last week for mutual give and take of information. Among the facts that came out:

- Barrel manufacturers want any other six-month period since 1946 rather than the one they have (first half of 1950) as the base for allocations. NPA may grant a revision.
- Wood pulp capacity will be increased by 2½ million tons a year if certificates already granted are acted upon. The stumbling blocks: getting enough chlorine, sulfur and alum to operate new facilities.
- Look for limitation orders on hydrofluoric acid early next year. One order would cut use of acid-grade fluorspar by 10,000 tons during 1952. Another would halve fluorspar consumption by the glass and porcelain enamel industries. A third would limit fluorspar inventories to a 45-day supply.
- Paint makers told the Government to lower its paint specifications if it wanted to conserve lead.
- First NPA action without a prior public hearing involved West Coast Tire & Rubber Co., whose rubber supplies were cut off because it had violated M-2 by using 600,000 lbs more than it was entitled to.

The Government's stockpile is beginning to look more like a checking account than a nest egg under the mattress.

Planners think it's time not only to stop accumulating, but also to start withdrawing in earnest. The stockpile's already been tapped for copper, and last week President Truman authorized withdrawal of lead.

Latest action is to stop stashing away tin. Supplies are no longer coming in since the Government won't meet Bolivia's asking price.

Four hundred million dollars is a lot of money—even at today's prices—and that's one reason why Kaiser Aluminum's and Union Carbide's latest financing moves are particularly newsworthy:

Kaiser will borrow a net $50 million from banks and $33½ on bonds, and sell 350,000 shares of $50 par preferred stock to raise the $100 million required for doubling the size of its Louisiana plant.

Union Carbide recalls the lush days of railroad financing in its borrowing of $300 million on two 100-year notes. Two insurance companies —Prudential and Metropolitan—are each making half the sum available.

If Union Carbide takes all the money before the deadline (Nov. 1, 1954), you can look for an accelerated expansion program. The firm has invested an average $100 million a year since the war, and the $100 million required for 1952 plans is expected to come out of the normal budget.

Industry is buzzing this week about other company developments:

Buffalo Electro-Chemical Co. will be sold to Food Machinery & Chemical Corp. for about $15 million. Merger will be effected by a stock transfer and Buffalo (chief products: hydrogen and other peroxides) will be operated as a subsidiary of Food Machinery.

Stockholders of Buffalo will make a tidy capital gain: The Alien Property Custodian sold 46% of the stock at auction last June for $4,310,000. That extrapolates to less than $9½ million for all of it.

What will happen to Mathieson Chemical's 26% ownership of American Potash & Chemical Corp.? Mathieson has parleyed with American Potash's management, trying to effect a merger.

But now talks have bogged down, and Mathieson intends to sell its holdings unless an agreement is reached within a reasonable time.

Another pair that doesn't quite see eye to eye: Mayor Morrison of New Orleans and American Cyanamid Co.

Morrison told the press that Cyanamid's new plant would produce "synthetic fibers and commercial chemicals." Cyanamid says, "It is not definite at this time that any synthetic fibers will be produced initially. . ."

The hassle is merely semantic. Cyanamid will likely make it official soon that the plant will produce acrylonitrile—for eventual use in the manufacture of synthetic fibers.

The $600 million-a year cosmetics and toilet goods industry will have a new rule book February 1. The Federal Trade Commission and industry representatives have hammered away at it for three years.

Like other industry practice rules, the new regulations are designed to prevent acts which suppress competition, restrain trade, fix or control prices through combination or agreement.

Unlike earlier codes, the new one includes an FTC statement of opinion on where and how the rules should be applied.

New products of the week: A resin finish for metals, a new synthetic rubber containing vinyl toluene.

Sherwin-Williams has the new finish, initial user of which is the Parker gas cigarette lighter. Chief claims: High abrasion resistance, good color retention. An office machine maker is also testing it.

Vinyl toluene (CW, June 23) moved a step nearer the big time as Goodyear Tire & Rubber ordered 30,000 pounds of rubber made with it instead of styrene. Reconstruction Finance Corp. will make it at its Borger, Texas, plant; but Goodyear developed the formulation—now known only as X-689—and road-tested tires made from it.

. . . The Editors

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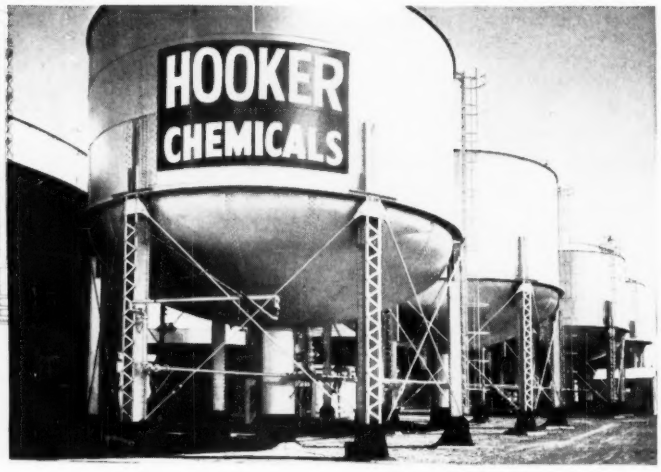

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BUSINESS & INDUSTRY . . . . .

Pulchritude and Pumps

Chemical world's lodestone last week was New York, where the Exposition of Chemical Industries was in full swing.

Show was the biggest yet. Its growth mirrors the rapid mushrooming of the chemical field.

Shortages of raw materials, labor mar supply outlook for coming year, maybe longer.

The chemical industry last week was mirrored in the 23rd Exposition of Chemical Industries, and visitors came from half way around the world to see what it reflected of the future.

• It was bigger than ever. All available exhibit space in New York's Grand Central Palace was filled. In fact, 59 prospective exhibitors were left out by lack of room. Many companies had expanded the size of their exhibits, and more new faces were in evidence.

• It was larger in exhibit staffs. Most companies found it good business to have at least one or two more representatives in New York than they had two years ago. The trend was toward having more technical and development men peopling the exhibits.

• It was a selling show. While few manufacturers obtained signed sales contracts, they were impressed with the number of good prospects on hand. One sales manager put it this way: "I've got my fill of the professional literature grabbers in 12 Chem Shows, but this time there are a helluva lot of people who've come in here with problems for us to work out."

For many exhibitors and spectators it was homecoming—a week in which to meet old acquaintances; a week when expense accounts were taxed by the "liquidity" of friendships.

But underneath the aura of camaraderie was a worry over the next business year. Some lines were already slacking as capacity increases to meet the post-Korea demand found that the demand had dropped. In others, over-supply was just around the corner. In many, however, where shortages of metals, sulfur, chlorine or phenol mattered, it was still a seller's market.

Stainless steel, though, was the worst bottleneck for equipment buyers and sellers. In stainless steel pumps, for example, molded plastic, ceramics and glass were substituting where possible.

Many metal products could be obtained only with 6- or 12-month delays. Equipment makers using other raw materials were more fortunate. "I'm selling lots of glass," said one salesman, "with those two magic words, 'immediate delivery.'"

For others, it wasn't material shortages that dimmed the sales picture. The question of where to get skilled workers was the real puzzler. And here, they saw little chance for relief.

The Lighter Side: But nobody was letting these problems really get him down.

Probably because they were definite exceptions to the general run of exhibits, Socony-Vacuum's and Monsanto's would be well remembered.

Socony devised one of the most painless ways of getting a sales message across—hiring models to hold up a placard with a punchy slogan.*

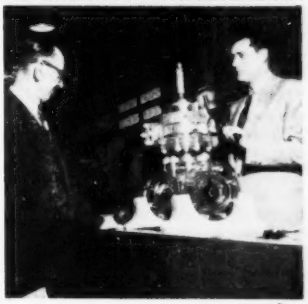
Monsanto took runner-up honors with its chemical bingo game. The crowd was often three layers deep waiting to match rows of chemical names to be able to yell "Monsanto!" for a prize.

Far too common to be a sideshow of their own were visitors from foreign countries. No fezzed, red-bearded Mohammedans made the exposition their second Mecca, but it was hardly unusual to hear a group of visitors conversing in French or German.

In any case, whether it was *Schwefelsäure* or sulfuric acid, it was still the language of chemistry. When the show was over, sales managers, development men and executives knew they had spent a tiring, nerve-racking chemical week—but one that was worth its weight in future sales.

* "Yeah," said a green-with-envy nearby exhibitor who was almost trampled to death, "but who's looking at their sales messages?"

FOR CHEM SHOW BUYERS: Mixers . . .



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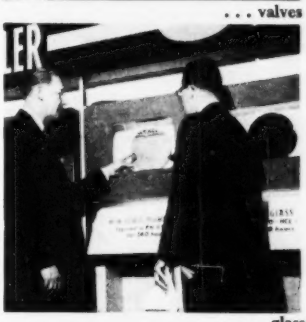

. . . glass

. . . drums.

Environment For Progress

"I worry about some of these inroads on the environment within which our free enterprise system has flourished . . . We should do something to curb these threats. The first thing to do is to have them brought out into the open, for the public to see and understand."

This was the conclusion of the thoughtful and provocative remarks made by Karl T. Compton, Chairman of the Corporation of the Massachusetts Institute of Technology, at last week's dinner honoring Phillips Petroleum Co. for winning the 1951 CHEMICAL ENGINEERING Award *(CW, Oct. 13)*.*

Speaking before an audience of 750 leading industrialists and educators in the Waldorf-Astoria's Starlight Roof, Compton paid tribute to Phillips and went on to make a serious and challenging appraisal of the environment necessary to technological achievement of the kind that brought Phillips its award.

Three Factors: Three factors enter into technological achievement, said Compton: facilities, men with training and ability, and an environment favorable to sustained creative effort. Facilities can be provided if there is a will to do so; at present there is a desperate shortage of trained engineers, which Compton feels will be with us for several years at least, and which may well prove to be the weakest link in our national armor; but it was to the proper environment that Compton gave most attention.

By environment he meant factors—incentive, opportunity, reward, prestige, regulation, tax policies—which either encourage or discourage technological developments. Ascribing this nation's business success to the scope of individual initiative, he said, "The way, in theory at least, is open for any person, however humble his beginnings, to achieve the highest success of which his abilities are capable."

Regulation, Yes . . . But: "Obviously," Compton admitted, "in such a complex society as ours, some regulations and safeguards are necessary in the over-all interest. The public must be protected against exploitation by selfish groups." But he went on to take strong issue with three areas of Government regulation: subsidy, excess profits taxes, and the Justice Department.

In deploring too much Government subsidy, Dr. Compton cited the case of British industrialists who claimed, "Our governmental subsidies have served to perpetuate technological obsolescence. We would be better off in the long run under a competitive free enterprise system." But he acknowledged that subsidies "may well be justified in temporary emergencies."

Compton feels that excess profits taxes tend to put too much added burden on initiative and success to the detriment of technological progress, since they are aimed at new products, added employment and new sources of profit. "Would our nation not be better off in the long run," he asked, " if the tax base were broadened, the normal tax raised, and the excess profits tax lowered?"

COMPTON: Subsidies, taxes, anti-bigness befoul the environment.

Species of Blackmail: Compton saved his most virulent blast for the operations of the Justice Department in prosecuting the Sherman Anti-Trust Act. As he understands it, he remarked, the Act was intended to protect free enterprise and the public against gouging by combinations in restraint of trade—not to be a barrier to size or success if these things operated in the public benefit.

But now the Justice Department is out against "bigness" alone, whether or not this bigness is harmful. In fact, Compton pointed out, suits have been brought by the Justice Department against companies for doing what they were asked to do by other Government agencies. This, he said, is felt by many to be a species of blackmail, so that the Justice Department can show a profit.

In many of our industries, he explained, a large portion of the time of top management, which should be devoted to making improvements, has been diverted to defending their companies against Justice Department attacks. Such a situation, Compton feels, is enervating to proper technological advancement, and in itself creates a poor environment for progress.

* Chemical Engineering's eleventh, awarded for ". . . meritorious contribution to the advance of the industry and profession . . ." Phillips' achievements: high abrasion carbon black, major contributions to cold rubber development. The award program was broadcast over a 226-station domestic network and beamed abroad by the Voice of America.

Solubility Solved

The development of large-scale production methods for riboflavin-5'-phosphate marks the beginning of a new commercial life for riboflavin (better known as vitamin B_2). Reason: Improved solubility of the new phosphorylated form opens a big market in liquid pharmaceuticals and nutritional products.

Insolubility is a painful word to riboflavin manufacturers. It recalls years of hard research aimed at correcting the one glaring weakness of their product.

Now that's all water under the bridge. Researchers at Hoffmann-La Roche, Inc. (Nutley, N.J.), have evolved a practical commercial synthesis for soluble phosphate esters of the vitamin. Key to the method is a chlorophosphoric acid, unfamiliar to most organic chemists yet highly useful for mild phosphorylations. With this reagent, riboflavin is converted, in good yields, to the 5'-phosphate.

Hoffmann-La Roche has patented its process for riboflavin phosphate and is in commercial production with the sodium and diethanolamine salts. (Merck & Co. makes the ammonium salt, but by a different process.)

Solubility of the phosphate ester is a striking improvement over that of the pure vitamin. Only 10 to 13 milligrams of riboflavin will go into 100 cc of water, in contrast to 6 grams of the phosphate. Previous efforts to solubilize riboflavin were for the most part unsuccessful. Treatment with gentisic acid is one notable exception, but even in this case solubility does not exceed 300 milligrams per 100 cc.

Back To Nature: Recourse to phosphorylation is a logical line of approach toward correcting riboflavin's insolubility; it's well established that the free vitamin is phosphorylated in the body prior to biochemical utilization. Phosphorylation of synthetic riboflavin thus produces not only a more soluble form, but one that's easier for the body to handle.

Working With Washington

Government-industry commercial relations got a going-over last week at a symposium presented by the Chemical Engineers Club of Washington. Speaking before the engineers and businessmen, Frank H. Weitzel, assistant to the Comptroller General of the U.S., and A. S. Alexander, Under-Secretary of the Army, discussed the Government's role; George T. Felbeck, vice-president of Carbide and Carbon Chemicals Co., elucidated industry's part.

Of interest to businessmen was Under-Secretary Alexander's description of the three types of procurement now used by the Defense Department:

- Joint procurement, such as is done by the Armed Services Petroleum Procurement Agency, which buys all gasoline and oil for the three services.
- Collaborative procurement, where one service, such as the Army, buys the equipment or supplies for all three services.
- Sole service procurement, where only one service is using the item.

Alexander said that for the fiscal year 1951, the three departments had written 2½ million contracts.

Not Easy: Keynoting the session, and drawing on his company's long experience with operating plants for the Government, Felbeck admitted, "It is not easy to work with the Government." But in the same breath he said, "It is the duty of every corporation to make those contributions."

Fixed Fee: Felbeck indicated that his company strongly favors the fixed-fee contract rather than the "dollar-a-year" type. The latter founders on the problem of determining overhead costs, which simply can't be distributed with any degree of scientific accuracy.

Felbeck emphasized that if a company is going to take a contract to run a Government plant on a non-profit basis, it must treat that plant just as it would one of its own. This means it not only sets up the organization and operates the plant, but also has the responsibility to do the planning, the looking ahead, seeing to it that the proper research and development work is started, the proper cost accounting done, and a proper budget system set up.

The corporation shouldn't try to reform the Government or its system of operation, Felbeck continued, but try to learn the Government's way and get on with the job it has to do.

Rough Sailing: During the lively question-and-answer period following the talks, Felbeck justified the taking of non-profit contracts, admittedly somewhat unfair to stockholders, on the grounds that the jobs had to be done, only big companies could do them, and because any attempts to get profits from the Government would be poor politics and poor public relations, and would evoke a severe "raking-over" by the newspapers.

Faced with rough questions from small-business advocates, Under-Secretary Alexander—who had stated in his talk that small business gets 75% of the Army contracts, and 30% of the procurement dollar value—brought out that a study of 13 major contracts indicated that 40% of the money represented went to small business on sub-contracts.

FELBECK: Working with the Government is no cinch, but necessary.

Potash Partnership

The recent Conservative victory in Great Britain is resounding in the Dead Sea wilderness: The Israel Government, abandoning its much discussed plans to nationalize the Dead Sea Potash Works at ancient Sodom, is expected to propose a partnership arrangement with the London-registered Palestine-Potash Ltd.

The thorny issue of resuming operations at the Sodom plant (which closed down during the 1948 Arab-Israel war) has long been the subject of protracted negotiations between the government and the company. Originally the firm was allocated $2½ million from the $135 million U.S. Export-Import Bank Loan on the condition that it raise an additional £2 million ($5.6 million).

But because of the uncertain economic and political conditions prevailing in Israel, the company was unable to do this. It was then that official quarters launched the idea of complete nationalization.

The decision to discard the nationalization plan came only after the British election led officials to conclude that "various sorts of political complications" might arise should the government take over the plant. Details of the prospective partnership are now being worked out by the Finance Ministry, and successful conclusion of the agreement will enable the company to purchase new equipment and go ahead with plans for modernization and expansion of the works.

LABOR. . . . . .

Organizing professional men has cropped up again as a serious problem. Professional engineers in British Columbia have appealed to the provincial labor minister for exemption from the provisions of the Industrial Conciliation and Arbitration Act—B.C.'s labor code.

Speaking for the engineers, R. E. Wilkins, Vancouver registrar-manager of the Association of Professional Engineers of British Columbia, says engineers in the province may be unionized if exemption is not granted.

Claiming that an engineer's duties do not permit him to join unions and conform to rigid hours of work each day, Wilkins stated that 50 engineers employed by the British Columbia Electric Co. had been compelled to join the British Columbia Electric Office Employees' Association, when they wanted to remain in their own professional association.

Engineers in other parts of Canada are excluded from unions by provincial law, but the British Columbia government has ruled that the ICA Act would have to be amended to exclude engineers in the province.

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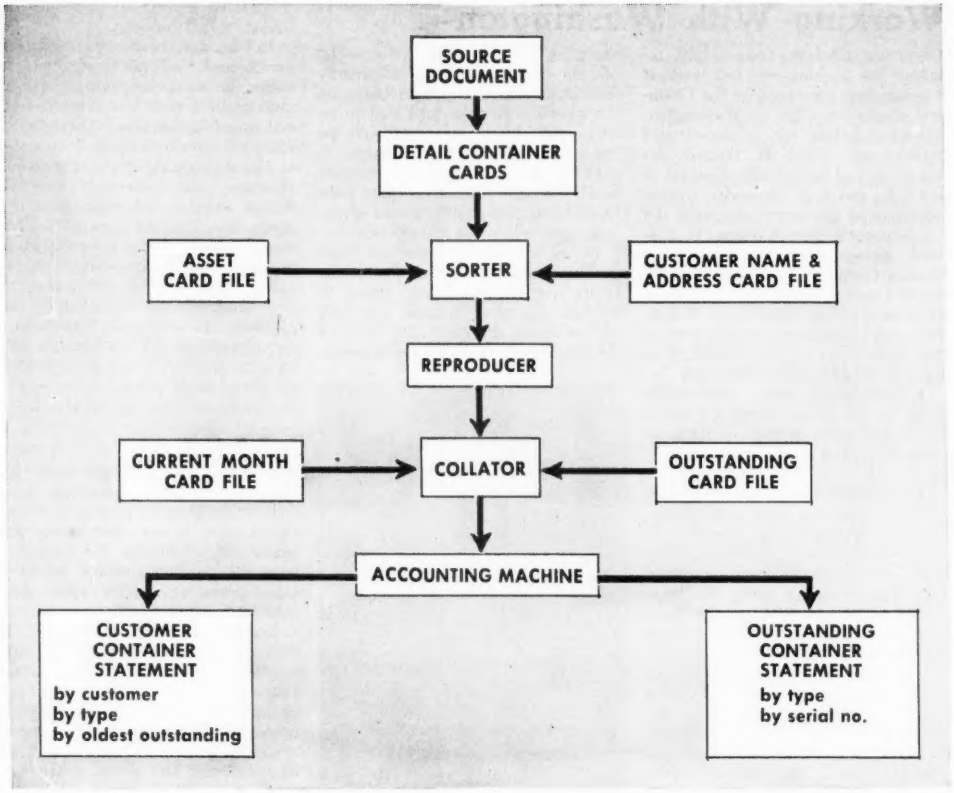
In a new two-year-contract signed with Canadian Industries, Ltd., members of the National Syndicate of Shawinigan Falls Cellophane Workers (C.C.C.L.) have received a 35¢-an-hour wage boost, bringing basic earnings to $1.34 per hour. The contract also calls for a 42-hour work week with the same take-home pay as the previous 44-hour week.

The employees had voted to walk out to enforce their demands, had rejected the findings of an arbitration board which offered them $1.27 an hour basis pay.



Keeping Tabs on Returnable Containers

Many a chemical company is casting envious eyes at Pennsylvania Salt Manufacturing Co. these days. For Pennsalt has a new container control system that enables it to establish, at any time, the location of some 40,000 returnable containers—including stainless steel drums, steel drums with replaceable rubber linings, plywood drums with rubber bag liners, rubber drums, and cylinders ranging from 6-pounders up to tank cars.

John L. Brown, manager of the billing and tabulating department under whose direction the system was established, modestly admits that "results have been gratifying." Some of the "gratifying results" include:

- End of customer complaints common under its old semi-manual card control system.
- Customer enthusiasm for the periodic statements telling them what containers, identified by serial number and shipping date, they have.
- Substantial increase in container turnover.
- Reduced container costs.
- Fewer shipping delays arising from lack of containers at shipping sites.
- Easy follow-up on unreturned containers by sales staff through monthly records issued to plants and sales divisions.
- Better analysis of accounting records, particularly when containers are lost.
- Discontinuance of individual plant records.
- Decreased work load in central accounting section.

The system responsible for these improvements is based on mechanically-handled punch cards assembled in various files from which periodic reports are compiled. Private line teletypewriter service between Pennsalt's Philadelphia headquarters and various plants supplements the system, and orders placed by teletype at Philadelphia are simultaneously received at the plants on order forms in the proper number of copies.

Source Document: Raw material for processing by the system is the Source Document or Tally Sheet, part of a multiple form partially prepared at various points and completed by the plant making the shipment. The plant shipping department inserts the correct serial numbers in the allocated and pre-numbered spaces as the containers are shipped, sends the document to the billing and tabulating department.

Inserting the serial numbers on the order form is a manual operation, and though the error rate is below 0.1%, this is the greatest source of error in the entire system.

Detail Container Cards: These cards

SERIAL NUMBER of each returnable container is recorded in allotted space on Source Document.

are prepared from data in the Tally Sheets and contain the following information, which is inserted in the card by mechanical means: customer code number, shipping point, date of invoice, invoice reference, customer order number (if any), sales value, product code number (type and size container), and serial number.

Asset Card File: There is a card for each returnable container in the service of the company in this file. The detailed information which makes up the container capital asset account is recorded: product code (type and size container), serial number, original cost, purchase date, depreciation rate and remaining value.

Customer Name and Address Card File: This file consists of master cards which contain the full name and complete address of all container customers. These are used along with the Detail Cards in preparing the quarterly container statement.

Sorter: This machine classifies any item of information punched on the cards to provide tallies on any aspect of container control. E.g., sorting by date sequence gives a total for different categories each day.

Reproducer: Information from one set of pre-punched cards is punched automatically into another set by the reproducer. Thus master cards remain in files; duplicates are processed.

Current Month Card File: Detail Cards covering every returnable container shipped during the current month comprise this file. After being checked for accuracy, the cards are collated with the Outstanding Card File.

Outstanding Card File: This consists of a card for each returnable container outstanding and is comparable to the Asset Card File in this respect. It differs, however, in that each card contains information on the whereabouts of the container and other facts. These data appear: customer code, customer's name, shipping point, date of shipment, invoice reference, customer order number, sales value, product code number, and container serial number.

Collator: This machine has three functions:

- Selecting: Automatically selecting individual cards to pull out of a mass of data items for special attention.
- Merging: Automatically combining two sets of punched cards into one set of given sequence. Used for filing new cards into an existing file.
- Matching: Automatically checking agreement between two sets of cards to separate unmatched cards or groups of cards.

Accounting Machine: The Customer Container Statement is prepared from the Outstanding Card File by this machine after the cards are sorted into proper sequence.

Customer Container Statement: This is sent to customers on a quarterly basis. These statements are listed by customer and by type container (the oldest outstanding is listed first within each product grouping). Further, each group is sub-totalled and entire groupings are counted and a grand total given. Main functions of these statements are in control of distribution to assure maximum turnover.

Outstanding Container Statement: A monthly listing, this is derived from a breakdown of the outstanding Detail Cards by type, by size within each type, and by serial number. These data are utilized by the plants chiefly in freight bill and incoming container analysis. The statement is also used by the billing and tabulating department in answering related correspondence from the trade and the sales division.

While the system may sound complicated, it's easy to run, saves time and money for Pennsalt.

JOHN L. BROWN, guiding spirit in development of Pennsalt's container accounting system, at the accounting machine.

NEW SYSTEM has reduced reading and transcribing 150,000-odd serial numbers per year to about 10,000.

Patent Reviewer

FIRST HEAD of the Defense Department's new Patent Policy Review Board is Rear Admiral C. M. Bolster, Chief of Naval Research. The board is inviting comment from individuals, corporations, and associations on all phases of patent policy and associated matters.

EXPANSION. . . .

Toxaphene: Hercules Powder Co. is spending $2½ million on a new toxaphene plant at Henderson, Nev. To increase capacity by 25%, the new unit is due onstream early in 1953. A portion of the expenditure will be for facilities to increase the supply of raw material from its Hattiesburg, Miss. plant, where one of the two existing toxaphene units is located. (The other is located at Brunswick, Ga.) Chlorine will be supplied by Stauffer Chemical Co.'s adjacent caustic-chlorine plant.

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Caustic-Chlorine: Hooker Electrochemical Co.'s new $10 million caustic-chlorine plant, which is now being engineered for installation at Montague, Mich., is expected to be completed by the end of 1953. Equipped with the Hooker Type S-3A diaphram cell, the plant will have a yearly production of about 100,000 tons of all products.

Half of the 400-acre plant site will be reserved for brine wells. One well has already been completed and others are to be drilled next summer.

Exploratory drilling for salt provided an unexpected dividend—discovery of natural gas. The size of this discovery is now being proved up, and Hooker will have first rights to any gas that may be found.

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Metallic Chemicals: American Metallic Chemicals Corp., a new company formed to manufacture various metallic chemicals used as intermediate materials by the chemical industry, has obtained a long-term lease on property used during World War II by the Oregon Shipbuilding Corp. at Portland, Ore. The equipment to be installed will cost about $500,000.

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Carbon Tetrachloride: Stauffer Chemical Co. has optioned 350 acres south of Rubbertown near Louisville, Ky., for the construction of a $2½ million carbon tetrachloride plant.

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Heavy Chemicals: Recovery of sulfuric acid from the near-by Shell refinery's acid sludge constitutes the major objective of a $1.6-million expansion program which General Chemical has under way at Fairmont City, Ill. Other products manufactured at this location: sodium aluminum sulfate, aluminum sulfate and lime-sulfur solution.

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Phenol: Canadian Kellogg Co., Ltd., will build the new phenol plant which British-American-Shawinigan, Ltd., is installing at Montreal, Canada. The new plant is to produce 13 million pounds of phenol per year from cumene via cumene hydroperoxide *(CW, Aug. 25)* under license from Hercules Powder Co. and Distillers, Ltd.

FOREIGN. . . . .

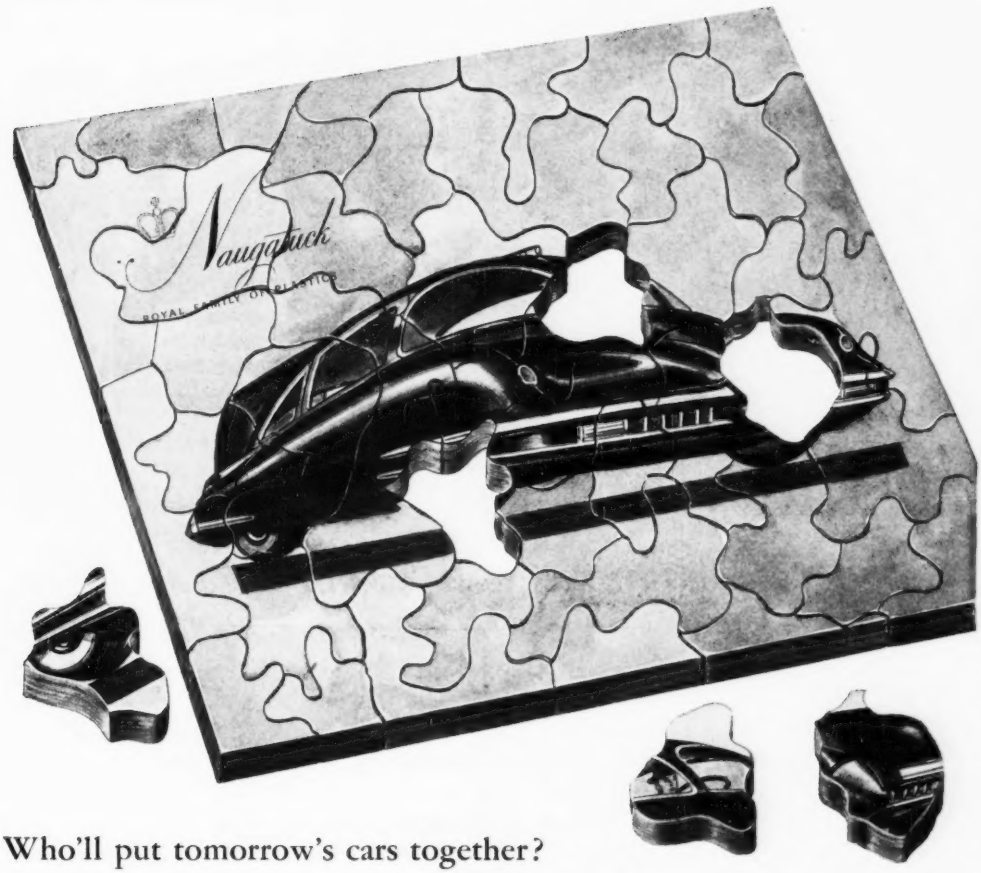
Carbon Black: Construction by Cabot Carbon of Canada, Ltd., a subsidiary of Godfrey L. Cabot, Inc. (Boston), of a 20 million pound oil furnace carbon

New Anti-Inflator

ROGER L. PUTNAM, manufacturer, and former mayor of Springfield, Mass., is President Truman's choice to replace Eric Johnston as Economic Stabilization Administrator. He took over the Government's anti-inflation program the first of this month.

Current List of DPA-Certified Chemical Facilities

COMPANY	LOCATION OF FACILITY	PRODUCT	AMOUNT ELIGIBLE	PER CENT
Phillips Chemical Co.	Crane, Tex.	Elemental sulfur	$ 510,200	70
Rohm & Haas Co.	Philadelphia, Pa.	Storage of methyl methacrylate	———	60
Great Lakes Carbon Corp.	Niagara Falls, N.Y.	Graphite electrodes	892,000	65
Wah Chang Corp.	Glen Cove, N.Y.	Tungsten	53,160	60
Rem-Cru Titanium, Inc.	Midland, Pa.	Titanium	126,000	65
Atlantic Refining Co.	Philadelphia, Pa.	Sulfuric acid	3,214,000	70
Ethyl Corp.	Edgemoor, Del.	Tetraethyl lead facilities	184,125	90
Continental-Diamond Fibre Co.	Bridgeport, Pa.	Vulcanized fibre	26,486	60
Continental-Diamond Fibre Co.	Newark, Del.	Vulcanized fibre	34,047	60
Union Carbide & Carbon Corp.	South Charleston, W. Va.	Tri-2-ethylhexyl phosphate	686,000	70
Aluminum Co. of America	Alcoa, Tenn.	Aluminum	335,000	60
Michigan Chemical Corp.	St. Louis, Mich.	Sulfuric acid	81,681	70
Pennsylvania Salt Mfg. Co.	Wyandotte, Mich.	Anhydrous ammonia	2,400,000	50
Dow Chemical Co.	Midland, Mich.	Styrene polymer	2,607,200	50
Detroit Chemical Works	Detroit, Mich.	Sulfuric acid	950,000	70
Dow Chemical Co.	Midland, Mich.	Polystyrene	268,000	50
Cobalt Nickel Reduction Co.	Fredericktown, Mo.	Ore concentrates	1,182,000	90
Consolidated Chemical Industries, Inc.	Houston, Texas	Sulfur	389,000 11,000	70 15
Taylor Refining Co.	Corpus Christi, Nueces City, Tex.	Benzene, toluene	1,052,000 2,173,000 530,000	90 65 40
Parker Bros. & Co., Inc.	Galveston Bay, Tex.	Chemicals	———	25
Cities Service Oil Co.	Near Blackwell, Okla.	Isobutane	3,880,000	65
Reynolds Metals Co.	Jones Mills, Ark.	Aluminum pig	216,500	70
Great Southern Chemical Co.	Corpus Christi, Tex.	Chemical-grade benzene and toluene	1,200,000 2,150,000 600,000 50,000	90 65 45 15
Lavaca Pipe Line Co.	Near Port Lavaca, Tex.	Aluminum	181,315	70
Telluride Mines, Inc.	Telluride, Colo.	Lead-copper concentrates	179,489	60
American Cyanamid Co.	Along Gulf Coast	Nitrogen	47,745,000	50



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***If you were making* automobiles, would you consider our new Vibrin polyester?**

What kind of fenders would this polyester make? The answer is here—thermo-setting polyester laminates have already produced the fenders every husband hopes for. They're dent-proof.

What about the car body itself? No need to guess—the automotive world has seen its first polyester roadster body. And an eye-opener it is!

Lighter than the lightest common metal.

Stronger than the strongest metal.

A solid surface-to-surface color that won't chip, crack or peel and a beauty to behold!

Resistant to everything that bothers automobile bodies—weather, water, exhaust fumes, sun, everything.

Produced with fewer pieces—with or without pressure or heat—at a small percentage of metal toolage costs.

Does this mean your car of the future will have "Body by Vibrin"? No one can tell now. But you can tell that the unusual polyester properties of Vibrin laminates can do fine things for your products from buttons to bathtubs. Investigate today.

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Without charge, send technical data on properties, uses, handling methods (specify desired end products).

I understand that, from this data, I can order suitable, free experimental samples.

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Sorbitol in quantity... to meet increased defense and civilian needs for polyols!

ATLAS has completed another expansion of its facilities for making sorbitol from corn sugar and other natural sugars. Sorbitol production is now ten times its 1947 volume! And we will expand our sorbitol production again as your requirements demand it!

Here's something else! Sorbitol is at the same low, stable price . . . unaffected by shortages or inflation because of the abundance of raw materials from which it is derived.

For many purposes, Atlas sorbitol stands at the head of its chemical family . . . glycerin and glycol . . . as a moisture conditioner. It is not a substitute and should be judged on its own merits.

You can stop worrying about wide fluctuations in the price and supply of polyols by placing your sorbitol order today for the quantities you need, and getting on our customer list. We are making immediate delivery. A new book about sorbitol is yours for the asking.

ATLAS INDUSTRIAL CHEMICALS DEPARTMENT

CHEMICALS ATLAS EXPLOSIVES

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ATLAS POWDER COMPANY, CANADA, LTD., Brantford, Canada

black plant will begin immediately at Sarnia, Ontario, Canada.

Representing an investment in excess of $2 million, the new plant will produce primarily HAF, high abrasion furnace blacks for Canadian consumption. Provision is also being made for manufacture of FEF, fast extruding furnace blacks, and other types.

Raw materials will come initially from U.S. refineries until the rapidly expanding Canadian refinery industry is able to supply the proper quality and type of highly aromatic liquid hydrocarbons. Expected to begin production sometime in 1952, the new plant will reduce imports of carbon black from the U.S. by some $2 million.

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Chile: Chile's first refinery is now in the engineering stage. To be located some ten miles north of Valparaiso, the $10 million refinery is to be a complete 20,000 barrel-a-day plant. It is being designed to produce liquefied petroleum gases, gasoline, diesel oil, and heavy fuel oil from either indigenous or imported crude oils. M. W. Kellogg (New York City) is handling the engineering.

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Italy: Two Italian companies, the Nobel-Societa Generale di Esplosivi e Munzione and the Societa Italia Settentrionale, are to be merged with Montecatini, the vast Italian concern engaged in mining and manufacturing chemicals and metals. The Nobel Company, a producer of various explosives, has in recent years built plants for other chemicals, while the Societa Italia Settentrionale makes liquid and gaseous hydrocarbon products, fertilizers, plastics, and intermediate chemical products in general.

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Vitamins: A. T. Suaco & Co. has recently put on the market the first vitamin preparation to be made in the Philippines by means of freeze-drying. The company has only limited facilities for this type of work at present, but expects soon to be able to fill domestic requirements for both lyophilzed vitamins and dehyrated blood plasma.

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Shale Oil: Pilot plant operations to make petroleum from bituminous shale have been begun recently by Cia. Industrial de Rochas Betuminosas at a location between Rio de Janeiro and Sao Paulo, Brazil. The company now has two retorts with a capacity of 20 bbls. per day in production and two more are nearing completion. Once the process has been thoroughly tested, the company plans to build a plant with an output of 2500 bbls. per day.

The state of Parana in southern Brazil, meanwhile, has allocated the equivalent of $500,000 for the construction of a 100 bbl.-a-day pilot plant at Sao Mateus on the Iguacu River near the state's southern border. Parana's shale deposits are estimated at 200 million metric tons, and tests conducted on outstanding samples have revealed the average crude oil content as 8.3%.

KEY CHANGES . .

Douglas A. Harwood: To deputy director, Program Coordination and Review Division, Office of Civilian Requirements, NPA.

Douglas C. Newman: From sales director, dyestuffs division to general director, Organic Chemicals Dept., Du Pont.

Miles A. Dahlen: From sales director, fine chemicals division to sales director, dyestuffs division, Du Pont.

Gordon M. Markle: From manager, domestic dye sales to sales director, fine chemicals division, Du Pont.

J. H. Humberstone: From Airco equipment manufacturing division to vice president, Air Reduction Co.

Anson C. McKim: To president, Merck & Co., Ltd.

Thomas D. Cabot: To vice chairman, board of directors, and executive vice president, Godfrey L. Cabot, Inc.

J. O. Hendricks: From assistant director to associate director, central research laboratories, Minnesota Mining & Manufacturing Co.

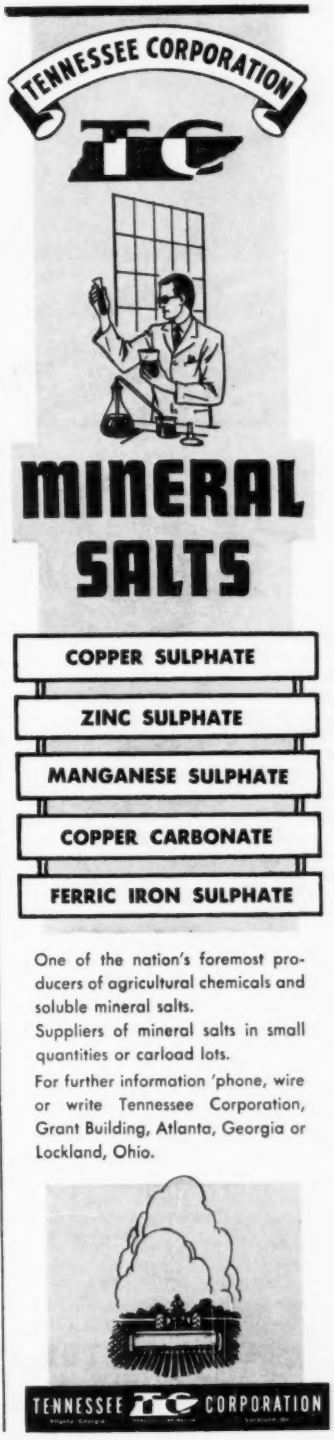
E. A. Yeager: To vice president, National Distillers Chemical Corp.

L. A. Roe: From technical supervisor of ore research, Jones & Laughlin Steel Corp., to director of mining and metallurgical section, Bjorksten Laboratories, Inc.

Harvey L. Slaughter: From regional director, paint and varnish division, Reading, Pa. to general manager, Durkee Famous Foods division, Glidden Co.

H. F. Winger: From regional director, paint and varnish division, Chicago, to regional director, paint and varnish division, Reading, Pa., Glidden Co.

Lloyd E. Parks: From chemical products manager, Sharples Chemicals, Inc., to general manager, Bee Chemical Co., Chicago.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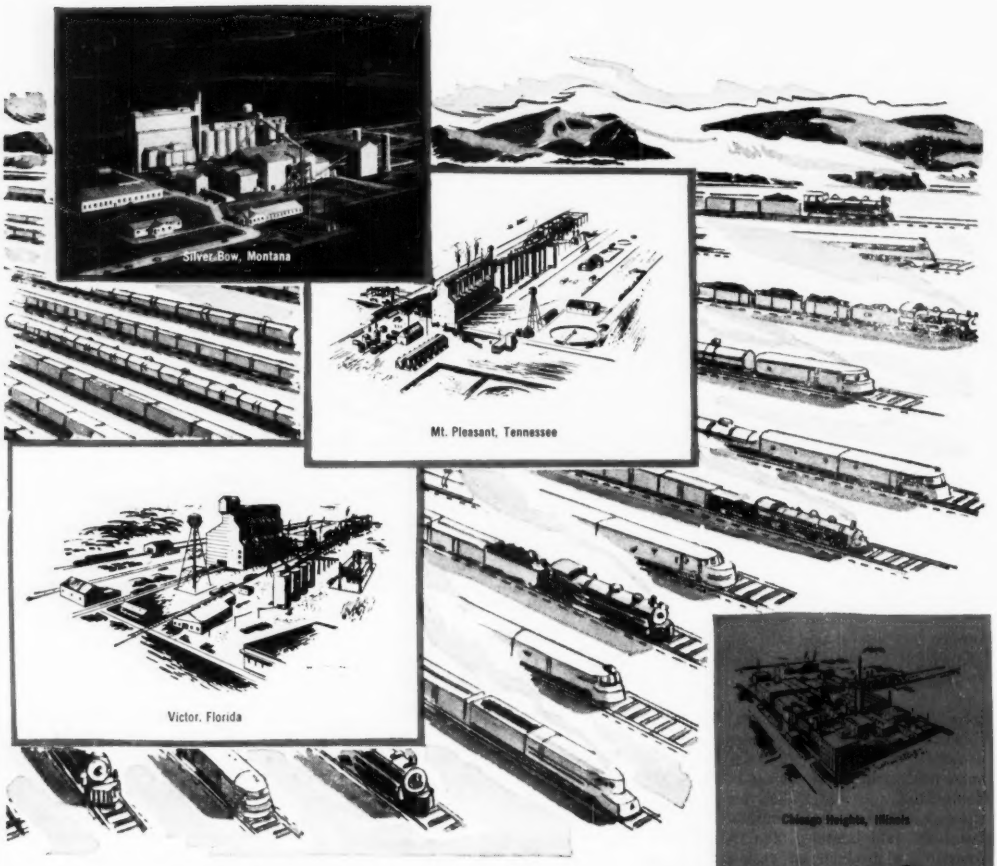

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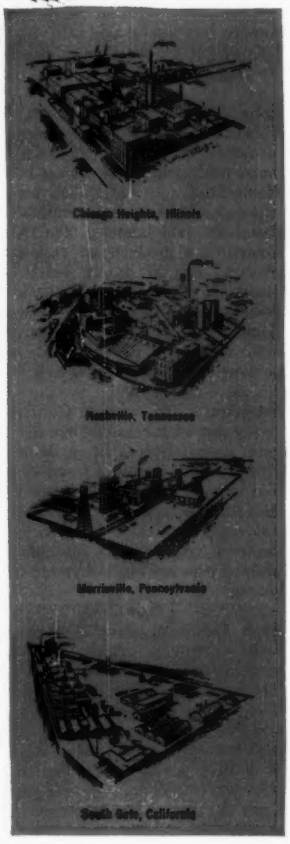

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METHIONINE RESEARCH: Obvious value and subtle implications.

Bigger By The Day

New methionine production facilities will highlight a growing acceptance of the amino acid in poultry feed supplements.

Research by leading chemical concerns has proved methionine's dollars-and-cents value to livestock growers. Moreover . . .

Development of large-scale production methods have dropped its price into the range of commercial utility.

Supplements for poultry and animal feeds are big business and getting bigger every day. The antibiotics have given the farmer most to think about so far; but other, less publicized chemical agents have been making quiet headway in their efforts to corner a share of his feed dollar.

Methionine probably is foremost as a "comer" in this direction. Indications of its commercial future may be found in results of methionine research by the Du Pont Co. An added profit return of several hundred per cent can be realized by the poultry grower through the judicious use of methionine supplementation.

Du Pont has been doing business in methionine, largely on a resale basis. But the positive outcome of research prophesies a more personal manufacturing interest—and probably in the not-too-distant future. If Du Pont does go into methionine production it will be in good company. Dow Chemical Co. has been producing for some time; so has U.S. Industrial Chemicals.

Chicken Every Sunday: The growing feedstuff market for methionine is due in great measure to rising poultry consumption. In 1950 nearly 600 million broilers were raised for market; this year the figure will be around 800 million and the industry expects a billion in 1953.

Almost every feed now contains an antibiotic, vitamins and fish meal. But experiments with other chemical products have been under way for quite some time.

Feeding trials with chickens conducted by Dow over the past two years give a good indication of the dollar-and-cents value of methionine supplementation. Ten-week feeding tests of methionine-supplemented diets showed increased growth and feed efficiency resulting in an average profit boost to the grower of about $25 per thousand birds. In some diets, weight response gave as much as $50 added profit per thousand.

Optimum level of methionine supplementation is still disputable, but one fact is crystal-clear: Methionine is most effective when added to feeds whose protein content is largely of vegetable origin.

Du Pont found, in early tests with Connecticut Broiler Rations, that three pounds of methionine, at a cost of $9, were needed per ton of feed. This netted the farmer only $10 extra per ton of feed—hardly worth the added effort.

In subsequent trials, the ratio was reduced and, surprisingly enough, the return was greater. (About one pound of methionine per ton of ration proved ample.) This is still inexplicable to Du Pont or any one else.

Convincing Feeders: To convince the feed industry it had something, Du Pont set up controlled experiments with the Department of Agriculture, Universities of Delaware and Connecticut and the company's New Brunswick, N.J. laboratories. Several types of feeds were used over a course of ten weeks: one unsupplemented feed; one with fish meal alone; one with methionine alone; and one with both fish meal and methionine. The outcome proved the case for the amino acid. Increase in poultry weight with the combined methionine-fish meal ration was 13%.

Use of methionine in animal nutrition research received a tremendous boost from the development of a synthetic method for producing the sulfur-containing amino acid.

Early last year Dow brought in the first large-scale methionine plant (at Pittsburg, Calif.) dropping the compound's price from several hundred dollars a pound to $3.

At this reduced price, methionine is within the range of commercial utilization in feed supplements. And a little goes a long way.

Aside from its obvious value to the livestock grower, methionine has more subtle implications for agriculture in general. A case in point: By making methionine-deficient crops suitable for feedstuff use, the amino acid might well spur greater output of such crops, considerably alter farming practices.

Hot Atom Clean-up

A formulation for ridding surfaces of radioactive decontamination, developed by De Ment Laboratories, is available from the Atomic Energy Commission on a royalty-free basis.

Young (31) Jack De Ment, who pilots the small Portland, Ore., business has worked up more than fifty decontaminating formulations for AEC. This one was ready four years ago, but De Ment wasn't spilling the beans until his patent came through. It's clear now, though, and assigned to AEC.

Applied to metal, wood or other solid contaminated surfaces, the product—a water solution of silicon tetra-

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chloride—complexes radioactive materials, forming a removable gelatinous mass. The activity of the formulation depends on formation of silicic acid by hydrolysis of the silicon tetrachloride.

Small contaminated areas may be scrubbed with the deactivating solution, but spraying is indicated for large surfaces. In any case, contact with skin must be carefully avoided.

No Cure-All: The specter of atomic attack played a substantial role in spurring development of the hot atom wash; but less spectacular laboratory applications doubtless will benefit too. De Ment isn't claiming wonders for his brainchild. "It has its limitations . . . is not guaranteed to work all the time and in all cases," he says. One reason: "Sometimes atomic particles become so imbedded that water cannot reach them."

Disposal of the decontaminating agent after it has picked up its radioactive burden is an important problem now under attack.

•

New AAAS Group: Section P, a new group devoted to industrial science, has been set up by the American Association for the Advancement of Science. Aims of the section: advancement of scientific knowledge and its application to industry; furthering the interests of industrial scientists; promoting public understanding and appreciation of the contributions of industrial science to human progress and welfare.

Allen T. Brandt, Bethlehem Steel, will head up the neophyte section. First meeting will be held in Philadelphia starting Dec. 28.

•

Add Four: Heyden Chemical Corp. is now offering experimental quantities of four new organic chemicals. The newcomers: 5-chlorosalicylic acid, suggested for use as a carrier in the dyeing of synthetic fibers; *m*-hydroxybenzoic acid, for application as an intermediate; dipentek diformal, for use as a resin ingredient; and di-*o*-cresotinic acid for specialty dyestuffs, surface coatings and printing inks.

•

Metals Neglected: More money for research on minerals and metals must be given the Bureau of Mines and the Geological Survey, says Defense Materials Procurement Agency Administrator Jess Larson. According to Larson the Defense Department and Atomic Energy Commission are spending a total of $2¼ billion for research and development of weapons, but long-range studies in minerals and metals get only $1 million. "If the emergency were to end tomorrow the needs of our normally expanding economy will bring us face to face with a minerals and metals crisis," says the DMPA chief.

JACK DE MENT: Mum was the word for four years.

•

Battery News: The Army Signal Corps reports that a new dry battery, using low-grade domestic instead of imported manganese dioxide, has passed pilot tests. The new battery costs little more than those using higher-grade manganese dioxide, lasts twice as long.

•

New Quats: Sharples Chemicals, Inc. has received a patent (U.S. No. 2,548,679) on the preparation of 3-(alkylmercapto)-2-hydroxypropyl quaternary ammonium halides by the combination of an alkyl mercaptan with an epihalohydrin in the presence of a tertiary amine. These quats should make useful detergents, emulsifiers, wetting agents and germicides.

•

German Octanol: A new German patent (803,832) describes a novel method of making secondary octanol. Here's how it's done: Castor oil is decomposed (with or without pressure) and the resulting octanol-methyl hexyl ketone mixture hydrogenated using copper chromite.

•

Borax Herbicide: Union Oil Co. of California reports that an emulsion of oil and an aqueous solution of an alkali borate gives an immediate kill of weed growth and retards regrowth for months. Borax is the preferred alkali borate noted in U.S. Patent No. 2,551,705.

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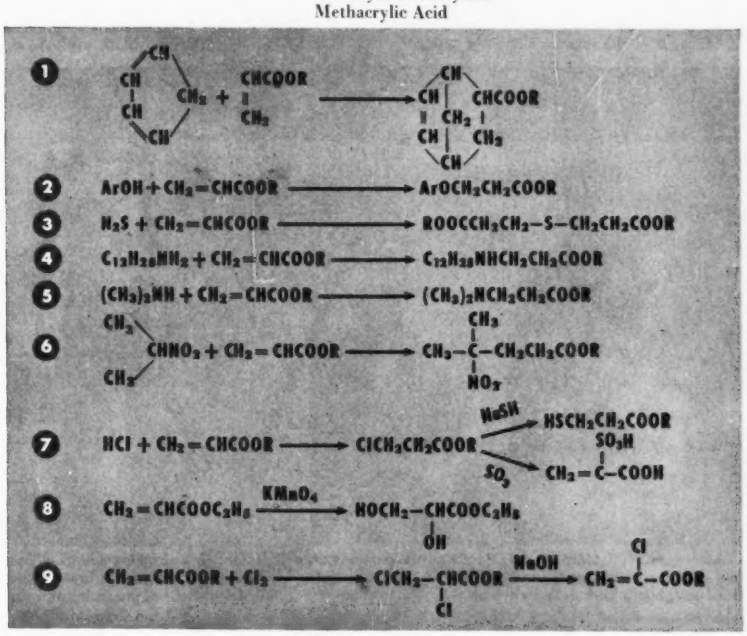
	n-Octyl Methacrylate	n-Octyl Acrylate
	n-Lauryl Methacrylate	
	Methacrylic Acid	

Typical Reactions



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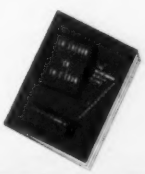
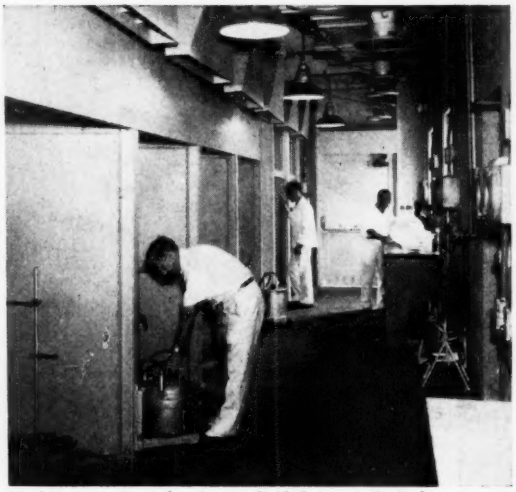
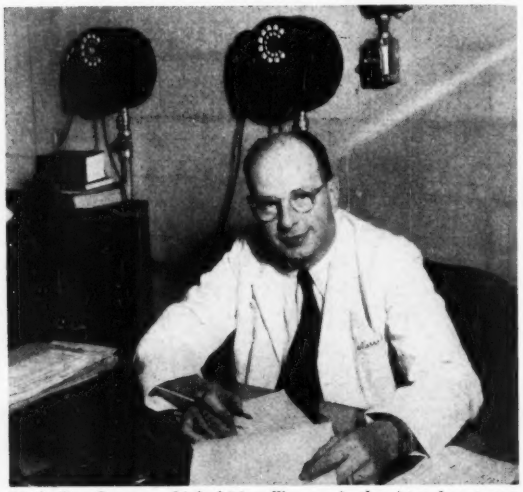


Ventilating and heating equipment, located between wings of the new laboratory, gets a look-see from supervisor Van Campen (left) and Lloyd Allen, manager of the organic chemistry group.



Working area in each wing is divided into individual booths. Each booth is fitted with a special blowout panel, faces a solid cement-block wall (right).



M. G. Van Campen, chief of Merrell's organic chemistry department, is responsible for many unique features of the installation. Note explosion-proof telephones and light switches.

It looks like a drinking fountain, but it's really an eye-washer. Wires enclosed in a metal box, spark-proof conduit and switch all minimize the explosive hazard.

Drug Lab Licks Blowout Bogey

"A safety engineer's dream." That's about as good a description as any for Wm. S. Merrell Co.'s shiny new organic research laboratory. Pharmaceuticals are Merrell's stock-in-trade, but the Cincinnati firm is no less concerned over the well-being of its chemists than it is for the health of its customers.

The new horseshoe-shaped installation is designed for safety and efficiency. The working area is divided into two parallel wings of booths containing outlets for steam, compressed air, vacuum, distilled water and electricity. Thus, if an explosion should occur in one wing, work could continue in the other.

Each booth has an intake and exhaust system to handle its own fraction of the 1.2 million cubic feet* of filtered and temperature-controlled air circulating through the building. This arrangement assures a positive flow of air in both directions, reduces the chances of gaseous diffusion and cross-contamination. In addition to the regular air-handling system, cubicles are equipped with flexible exhaust lines for localized suction if needed.

Specially designed outer walls,

* Enough to ventilate 100 five-room houses.

Closeup highlights self-sufficiency of booth. Automatic ventilation assures adequate air supply to each unit.

made of quarter-inch-thick asbestos-like panels, are so constructed that a blast would find them a small obstacle to easy escape. As an added bit of insurance, the laboratory building is separated from administrative, storage and processing areas by heavy steel fire doors and a thick concrete wall.

Although every effort has been made to minimize the damaging effects of a blast, equal consideration was given to prevention. All electrical wires and fixtures (telephones, clocks, drinking fountain, lights, temperature controls, etc.) are sealed in steel or glass to offset the danger of sparks. Moreover, special non-sparking metal (phosphorus bronze) is used in the moving parts of the laboratory's air-dling equipment. Even the floors are made of a special cement that won't spark when struck by metallic objects.

Only five chemists and their laboratory assistants will occupy the new facilities. Emergency protective devices are more than ample for the group. In addition to individualized ventilation and explosion-proof wiring, the setup is replete with convenient pedal-operated showers and eye-wash fountains.

Credit for the design of the laboratory goes to Merrell's M. G. Van Campen, Jr. (chief of organic chemistry), Lloyd Allen and Rowland Kleine. Aside from research, the company will use the new installation for producing such pharmaceuticals as ceepryn chloride, bentyl hydrochloride, and the popular antihistamine decapryn.

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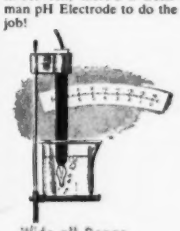

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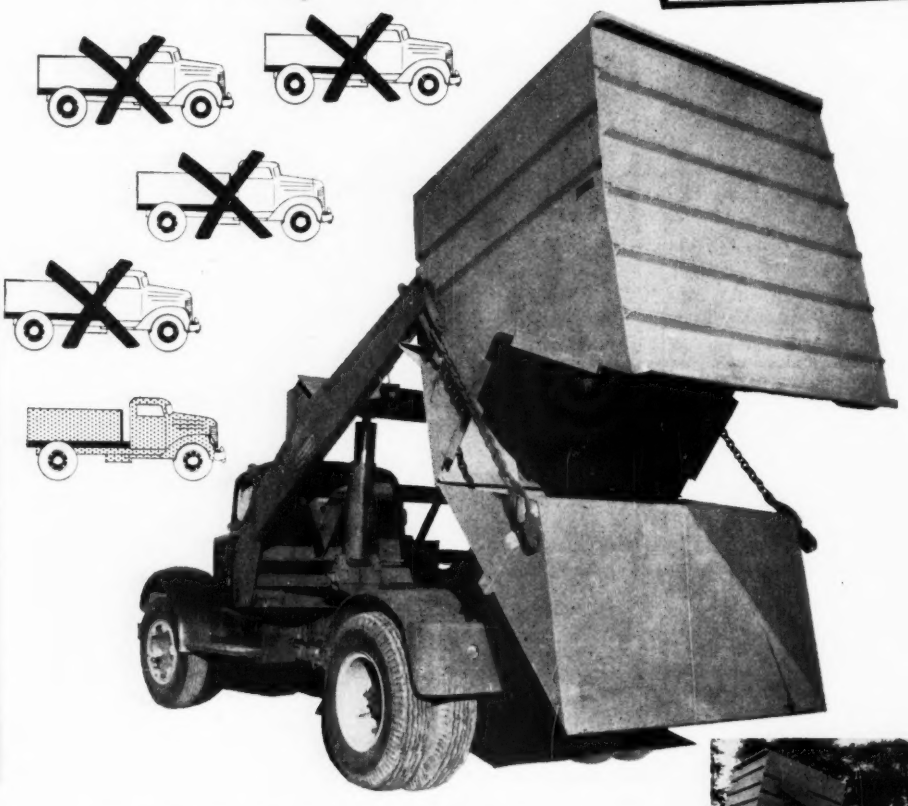

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PRODUCTION.....

Wanted: Cheaper Titanium

Industry eagerly seeks a cheap process—preferably electrolytic—for making titanium.

Latest method comes from a Columbia student, but industry has processes closer to development.

If a cheap route is found, the stakes are big and the one who gets there first will be in the driver's seat.

In the best traditions of a research race, some of the top brains in the country are dedicated to the proposition of finding a cheaper way of producing metallic titanium.

Although the only two commercial producers – Du Pont and Titanium Metals–are putting their faith in the almost time-honored magnesium reduction of titanium tetrachloride (Kroll process) for the immediate future, long term prospects point to an electrolytic process as the most attractive means of getting more titanium cheaper.

ARTHUR KERBICEK: Laboratory process needs more testing.

But despite big-company interest in electrolytic titanium, the latest development along those lines comes, not from an industrial laboratory, but from a college campus. At Columbia University, a young, scholarly graduate student, Arthur Kerbicek, says he has an electrolytic method for reducing the tetrachloride.

Working at the suggestion of Columbia's Colin Fink, Kerbicek spent three years on the process. The greater portion of the time, however, he spent in search of an extractive process. As Kerbicek explains: "I sort of backed up to the whole idea." Since he is still looking for a buyer for his process, Kerbicek is understandably reluctant to discuss technical details. He does say that his process is inherently continuous and suitable for producing zirconium metal as well as titanium.

More Testing: Furthermore, Kerbicek makes an estimate–admittedly rough–that his process can turn out titanium that will sell for $2 a lb. Even though he has never produced any metal that would pass muster as "commercially pure titanium," he is convinced that his process can do it. He adds that the required equipment is not intricate but he was not able to duplicate it in the laboratory.

In any event, Kerbicek and the staff at Columbia agree that the process needs more testing in a pilot scale. Industry takes an even more conservative view, thinks the process must first be proved capable of turning out high-purity titanium.

Double or No: Elsewhere, other processes figure to be a lot closer to the commercial stage. Eugene Wainer, research head for Horizons, Inc., said the Cleveland plant to pilot his process is nearing completion.

Earlier this year, Horizons created a stir when it disclosed that it had a cheap process for titanium. With Ferro Corp., it had formed Horizons Titanium to pilot plant the metal, then produce it commercially if the process panned out.

Like Kerbicek, Wainer is unwilling to talk about this process, won't even confirm Navy cost estimates. However, original speculation that it was an electrolytic reduction now seems a safe bet. It is also likely that Navy figures were on the conservative side and that Wainer actually figures titanium costs at 28 cents a lb. Another good bet: Wainer's process involves the electrolytic reduction of a titanium double fluoride.*

Double fluorides have been postulated as a logical starting material for an electrolytic process. And Kawecki Chemicals has a new plant in Boyer-

* If the Horizons process turns out to be commercially feasible, the cycle will be complete. For when Berzelius first isolated relatively pure titanium in 1825, he did it by a sodium reduction of a titanium double fluoride, potassium fluotitanate.

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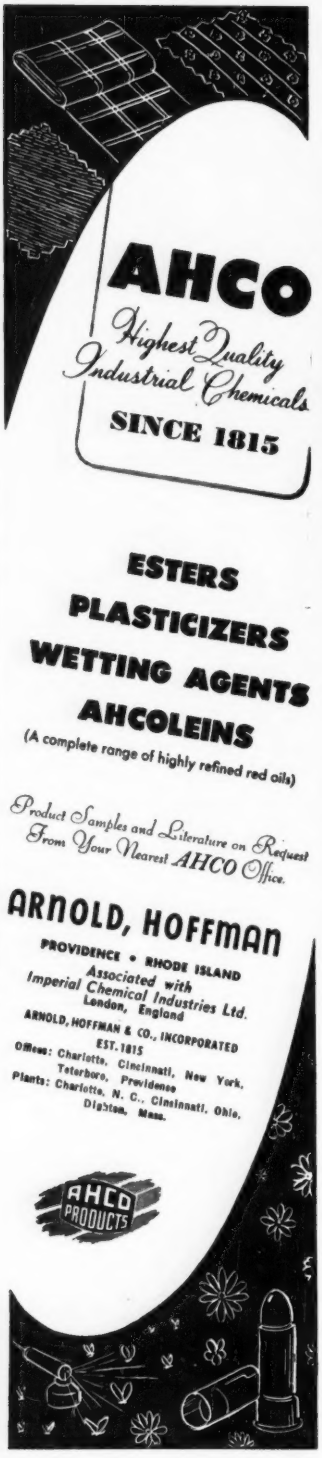
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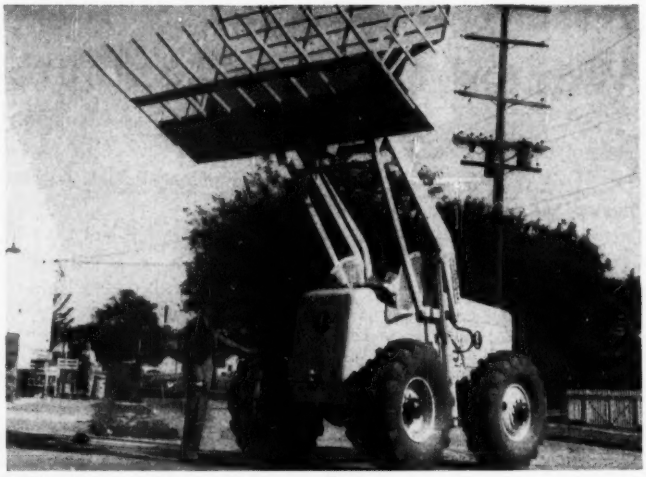

Modern Beachcomber

BEACH BUGGY designed by Soil Renewal Products Co. (Portland, Ore.) is capable of picking up 3½ tons of seaweed per stroke. The chemical potential of seaweed has long been recognized but it has never been exploited on a commercial scale. Now Soil Renewal is starting a commercial project, will use the seaweed principally as a fertilizer. The company is also looking into its possibilities as a supplemental livestock ration. This year's seaweed harvest is expected to exceed 250,000 tons.

town (Pa.) for making double fluorides of titanium and zirconium.

President Kawecki says that he is turning out carload quantities for the aluminum industry and that the aluminium end use was the basis for a certificate of necessity for the plant. However, it is reliably reported that Wainer has purchased experimental quantities of the double fluorides from Kawecki.

National Lead (with Allegheny Ludlum, joint owner of Titanium Metals) also has an electrolytic process for making titanium which it has been pilot-planting in Sayreville (N. J.). In fact, a trade rumor has it that National Lead, on being offered a look at Wainer's process in exchange for a six-figure sum, refused it on two grounds: First, it had its own process; and second, it thought that Wainer's cost figures, based on laboratory-scale tests, were optimistic.

Japan's in the Act: Even outside the United States, "dollar-a-pound titanium" is getting to be a magic phrase. In Japan, for instance, Hiroshi Ishizuka, son of the president and founder of Osaki Special Steel, thinks his company can make titanium for that figure. Just six years out of Osaki University, the young Japanese says he has the clue to low-cost titanium. Given enough encouragement (in the form of American dollars), Osaki is prepared to start a project which will eventually make 100 tons of titanium a month.

Osaki would start with titanium-rich slag obtained as a co-product from Japanese iron sands. Ishizuka's method of recovery seems basically the same as the commercial processes employed in this country. Ishizuka also guesses that the United States will be the principal titanium market for years to come; hence his wish for American capital. It is not clear whether or not he has calculated the costs of hauling titanium from Japan to this country in his estimates.

Old Reliable: There are several other methods of getting titanium from its ores, but the one that looks like the best route for tonnage titanium in the immediate future is the Kroll process or modifications of it. It has been modified by the Bureau of Mines and further improved by Du Pont and Titanium Metals. In fact, the process has been so altered that one producer says that Kroll himself would hardly recognize it.

A modified Kroll is the process used by Titanium Metals for its Henderson plant, which is destined to produce ten tons a day by the end of next year. A similar process is employed by Du Pont at its Newport plant (to hit a 600-ton-a-year rate by the end of 1952), will also be used in its new plant which will be comparable in size to Titanium Metal's. Du Pont is still negotiating for the latter plant with the Government.

Costs Rule Markets: For the immediate future then, the modified

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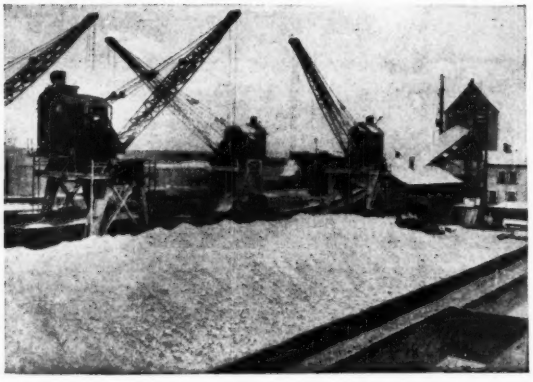
SULPHUR

*Interesting Facts Concerning This Basic Raw Material from the Gulf Coast Region

*LOADING



Sulphur intended for vessel shipment is brought to Galveston by rail from the mines at Newgulf. It is transferred directly from cars or from storage bins to the vessel.

The loading plant consists of two parallel storage bins spaced far enough apart to allow room for railroad tracks, tracks for the hoppers and cranes, and an endless conveyor belt. The belt along the center line between the bins is straddled by four cranes and their movable hoppers.

The cranes pick up the sulphur from the bins or cars and discharge into the hoppers, which automatically feed the belt. It is weighed while on this moving belt. After weighing it is discharged onto a smaller belt which in turn discharges through a cylindrical telescopic spout directly into the vessel's hold.

Loading operations at our Newgulf, Texas mine

TEXAS GULF SULPHUR CO.
INC.

75 East 45th St. New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas

Kroll processes loom as the best route to cheaper titanium. National Lead thinks that when the Henderson plant hits full stride, the metal can be sold for less than the present $5 a lb. for sponge. Du Pont once predicted that it could be sold for $1.50 to $2.50 a lb. when output reached a daily five or ten tons a day. Since that time, estimates have been revised—possibly downward.

But even at costs within that range, titanium would be an expensive material of construction. Right now it's strictly a seller's market (although it is doubtful that anyone has ever made money on titanium). The big question: What will happen to the market for titanium when defense needs subside?

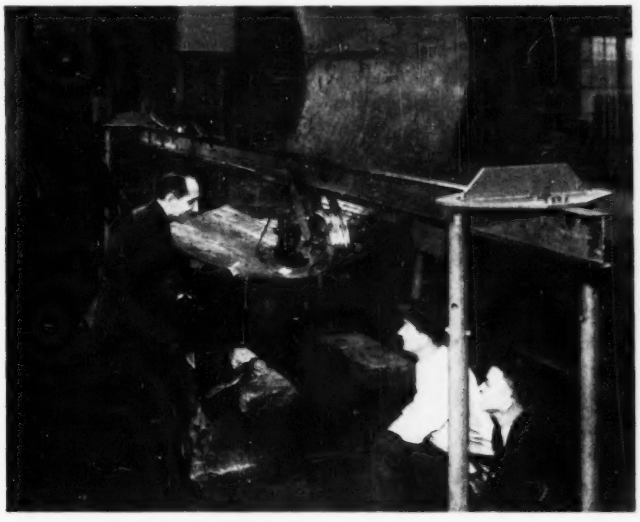
The only answer is that as long as there is no other material that can duplicate titanium's performance, there will be a market. Unless costs are pared appreciably, it will be an extremely limited one. If cheap electrolytic titanium can be produced, the market will be wide open: and the one that gets there first will be in the driver's seat.

EQUIPMENT . . .

Pocket Pump: Eco Engineering Co. thinks it has the solution to the problem involved in transferring small volumes of corrosive liquids. It has introduced a line of Allchem pumps. Pump casings and shaft are made of stainless steel, but the big feature is the use of Teflon fluoroplastic in impellers and stuffing box. They can also be obtained with Teflon fluoroplastic self-lubricating bearings. The material's resistance to chemical means that a single pump can be used for a variety of materials and should make for important strides in standardization, says Eco. Pumps are small, compact and have a capacity range of one to twenty gallons per minute. Eco is aiming them for chemical applications in the laboratory or plant.

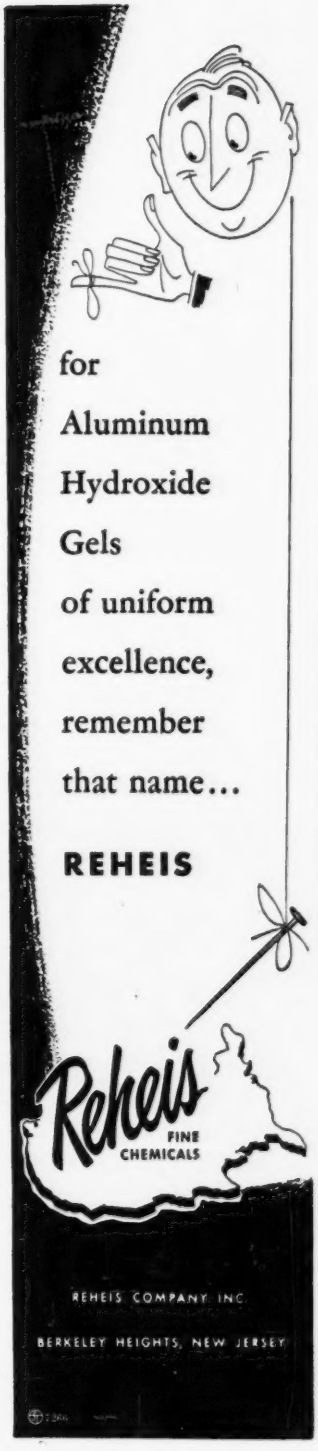
•

Wood-fired Turbine: An experimental wood-fired gas turbine has been developed by the Oregon Forests Products Laboratory on the Oregon State Campus. In one trial run, the experimental unit, which was based on 200 hp. requirements, burned 600 lb. of mill waste sawdust with a moisture content of 55% in an hour. The unit does not require water; hot gases formed during the combustion of wood are carried directly to turbine. The turbine runs a compressor which furnishes air for the combustion as well as a generator. Gas not used in the turbine is said to be satisfactory for drying lumber.



Cuprolum Debut

LEAD-CLAD COPPER, in addition to lead-clad steel (CW, Nov. 17), will be produced by Knapp Mills. President Knapp says a machine—developed by American Viscose and turned over to Knapp—makes the first automatic process available. He says the copper material (Cuprolum lead-clad copper) combines the properties of copper and lead, predicts its use in operations where it is necessary to heat or cool corrosive substances.



THE QUAKER OATS COMPANY

Announces

the completion of its NEW
QO-Furfural Plant at Omaha, Nebraska

The Quaker Oats Company's Omaha Chemical Plant is now producing the industrially important chemical, QO-Furfural. This chemical is made from raw materials such as corn cobs and oat hulls which are replaceable yearly.

The first QO-Furfural was produced at Cedar Rapids, Iowa 29 years ago. Now this versatile chemical is made not only at Cedar Rapids, but also at Memphis, Tennessee and Omaha, Nebraska.

QO-Furfural is used in refining lubricating oils, gas oil and catalytic recycle stock; extractive distillation of C_4 hydrocarbons; as a chemical intermediate in the production of nylon, furfuryl alcohol, tetrahydrofurfuryl alcohol and other chemical derivatives; as an aldehyde in resin manufacture and as a reactive solvent.

A request on your letterhead will bring you the Bulletin entitled "Current Uses of Furfural."

The Quaker Oats Company CHEMICALS DEPT.

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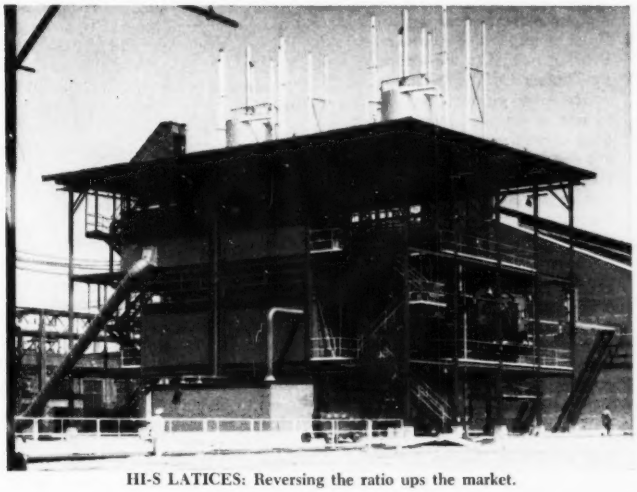
In Japan, F. Kanematsu & Company, Ltd., Tokyo



HI-S LATICES: Reversing the ratio ups the market.

Other End of the Blend

High styrene-low butadiene copolymers are opening new specialty fields to GR-S latices.

Widely used in paints, floor tiles, binders and shoe soles, they are pushing their way into shoe uppers and luggage.

Production is now in the multimillion-pound-per-year bracket, will go higher when more styrene and butadiene are available.

It wasn't until the early forties that the idea of a reversed formulation of styrene-butadiene copolymers popped up. GR-S synthetic rubber with its 70% or more butadiene had been around for some time, but the other end of the scale hadn't been tried out commercially to any great extent.

Uses developed only in the past few years for these high styrene-low butadiene copolymers, however, now represent markets in the multimillion-pound-per-year class. The styrene-butadiene copolymers used in paints and paper coatings chalked up a total of about 40 million pounds manufactured last year, while the styrene-butadiene products usually blended with elastomers, to make shoe soles and floor tile totaled 30 million pounds.

Now, Goodyear Tire & Rubber Co.'s introduction of its Neolite material as a substitute for leather in shoe uppers and luggage (formerly it had been feasible for soles only) promises to boost these figures considerably.

On Terra Firma: In fact it was the shoe sole business that first brought Hi-S materials into prominence. Materials such as Goodyear's Neolite were introduced in 1944 to the shoe trade where they soon gained acceptance as long wearing materials for soles, heels, and innersoles. Since then Goodyear has expanded its capacity by some 700% with another 40% expansion to be completed this year.

In 1947 nuclear (Hi-S elastomer blends) accounted for only 20% of the soling materials used; the other 80% was leather-based. Today they are on 80-90% of all children's shoes, on a good percentage of work and sport shoes, and are elbowing into the high styles.

Raw materials for these new soles are available from a number of sources, and identified as Marbon 8000 (Marbon Corp.), Goodrite Resin 50 (Goodrich Rubber Co.), Pliolite S-6 (Goodyear Tire & Rubber Co.), Kralac A (Naugatuck Chemical), Darex (Dewey and Almy), and Butaprene (Firestone). Blended with elastomers they crop up with trade names as Avonite, Neolite, Nuron, Panolite, etc.

"Nuclear" soles are moisture-proof. Thus they are much more wear-resistant than leather, which becomes weak when wet.

They are cheaper than leather, too. Shoe manufacturers figure that such soles are 25-30% cheaper than comparable leather soles, cost less to attach to the leather upper parts of a pair of shoes, and require less finishing and polishing. Leather is rolled under high pressure, becomes stiff, and requires breaking-in. The Hi-S sole is flexible from the first, stands up under thousands of flexes in a test machine while leather cracks and breaks after only hundreds.

Paints and Binders: Up and coming products are Hi-S resins made for concrete, stucco, brick, and industrial corrosion-resistant finishes. These coatings can even be applied to green plaster (they have excellent alkali resistance) where oil based paints would soon fail.

Household emulsion paints based on such latices are, of course, now well established (*CW, Aug. 25*).

They dry quickly to a washable, durable, continuous film which is rubbery and fairly soft. But the styrene content must be kept below 65% or film forming characteristics vanish. At present only interior type paints are available, but most of the larger paint companies have been working feverishly on exterior types, are believed to be near success.

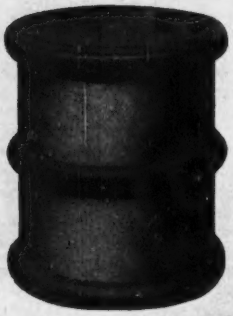
Similar latices have come into their own as binders in quality papers. Replacing casein, starch, and other materials, they help produce a smoother, more flexible, water-resistant paper.

One of the raw materials used for these paper coatings is Dow Chemical Co.'s Latex 512K, and the fast growth of this outlet is indicated by the fact that Dow has increased production at its Midland, Mich. latex plant (see cut), and more than doubled capacity with a second plant, at Freeport, Tex.

Still Growing: The market for the Hi-S copolymers has just begun to be exploited. As binders they are finding their way into improved types of oil cloth and linoleum where they impart superior flexibility and toughness. They are replacing casein and natural gums in industrial materials such as wall boards and acoustical ceiling panels, and further growth in the paint industry can be expected.

Unfortunately, production must be geared to raw material supplies, and to date both styrene and butadiene are short, promise to be so for quite some time. Once these materials appear in large quantities, production of Hi-S copolymers will soar.

ALL RUBBER DRUM



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13 gallon capacity

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Ski Spray

A new aerosol is running a distribution race with cold weather. Duk Kote, a protective coating for skis, is being rushed to winter sports areas by Thomas Co. (Minneapolis, Minn.).

The new product can be applied to wet or dry skis, indoors or in –30 outdoor temperatures. Major constituent is a high-melting-point microcrystalline wax which gives a flexible protective coating. Other components: an ingredient imparting thixotropic properties so that the spray sets up as a thick coating without running; an additive displacing water from wet ski surfaces to promote adhesion of the wax; and a corrosion inhibitor to protect metal and leather parts from salt and other corrosives.

The 12-oz. aerosol is filled by Continental Filling Corp. (Danville, Ill.), retails at about $1.95. It is available in Minneapolis, Hanover, N.H., and will be soon in New York.

The formulation was originally marketed in bottles as Power Film. Sold to highway departments, it was used as a rust preventive and protectant on snow plows and other equipment. Thomas Co. plans to introduce a similar aerosol formulation for such applications in the near future.

Insecticide Act Upheld

The constitutionality of Federal Insecticide, Fungicide and Rodenticide Act of 1947 has been upheld in the first reported decision interpreting its scope. Its validity had been challenged on the grounds that it is too vague and gives the Secretary of Agriculture power to determine what shall constitute a crime without setting up a standard for the Secretary to follow.

In the case, *United States v. Weinreb et al.* 99 F. Supp. 763 (1951), the defendants had moved that the U.S. District Court for the Southern District of New York dismiss an information charging a violation of the registration, misbranding and adulteration provisions of the act; and the court denied the motion. The specific charge was that the defendants in New York had delivered a disinfectant for shipment to a New Jersey consignee without registering it with the Secretary of Agriculture and without properly labeling it.

The contention of the defendants, in addition to attacking the constitutionality of the law, was that disinfectants were not defined in the law, and hence, were not within its scope. But the court held that the product was an "economic poison" as defined by the law since its label claimed it "kills germs" and is "an effective repellant to insects and vermin." The court further stated that the Secretary of Agriculture has issued a regulation specifically defining a disinfectant as fungicide, and that in its eyes, the regulation is reasonable and logical.

Inspection for Leads: Agents of the Department of Agriculture had examined the defendants' books and records, and the defendants moved that evidence so obtained be suppressed. The court concurred regarding specific evidence obtained during the actual inspection of the company's books, since the law prohibits using as evidence in criminal prosecution of a person, information he has revealed under the sections of the law requiring anyone dealing in economic poisons to allow Agriculture agents access to his records.

The court, however, noted that the law does not preclude used of evidence obtained from visits to consignees even though name, address, etc., of the consignee were obtained through inspecting a defendant's books.

Germicide Family

Four products – an industrial and household germicide, a soap and shampoo, a floor and wall cleaner, and a detergent for dishes and glassware—will comprise the Linol family of bactericidal specialties to be introduced by Lincoln Research, Inc. (Toledo, O.), next month.

Each will contain Linol, the company's trade name for 3,5-dimethyl-4-chlorophenol, a non-toxic germicide also known as PCMX (*CW, June 9*). This crystalline white powder up to now has been used principally in Europe, but specialty formulators in this country are showing considerable interest in it, and Lincoln expects to be the major U.S. manufacturer of items containing the chemical.

All four products will be liquid concentrates packaged in 5-, 15-, 30- and 55-gallon drums. For use, they will be diluted with water. Priced competitively, the new materials will be marketed in all states east of the Rockies through jobbers and repackagers for resale under their own private labels. Advantages claimed for the active germicidal ingredient and products containing it are non-toxicity, noncorrosiveness, low cost, absence of staining, mild odor and high efficacy.

The new line is expected to bolster sales of Lincoln, a seven-year old company which has been doing a business in excess of $100,000 the past two years. Composed of three men—presi-

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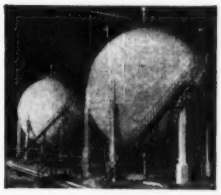

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Pressure spheres store ethylene oxide at the Jefferson plant at Port Neches, Texas.

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Briefs

From recent literature

Antimony trichloride and similar compounds react with ethylene oxide to give haloethyl derivatives which may be utilized in the preparation of protective coatings, impregnants, adhesives, binders, and fungicides.

Non-glutinous starch (e.g. corn starch) is modified so as to resemble closely glutinous starch by reacting the granular starch under pressure with about 5% by weight of ethylene oxide. The granular structure is not affected, the product will form a cohesive paste when cooked with water and retrograding tendencies are greatly reduced. These are properties which have been found useful for producing veneer glues, paper sizing and coatings, fabric finishing materials, textile printing pastes, and adhesives.

Desulfurization of hydrocarbons is accomplished by contacting the hydrocarbon with ethylene oxide at 150-250°F and separating the resulting hydroxythioethers by distillation.

Creaming rate and cream solids concentration of formaldehyde-treated, chemically creamed natural rubber latex is considerably increased by the further addition to the latex of a non-ionic surface active agent. The surface active agent is formed by reaction of ethylene oxide with a fatty alcohol, fatty acid, or alkyl phenol.

Sterilization of plaster bandages by treating the bandages overnight with ethylene oxide at 37°C proved satisfactory. Wet and dry heat were found unsatisfactory.

These developments are abstracted from recent publications or U. S. patents. They may suggest applications of Jefferson Ethylene Oxide in your products or processes.

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SPECIALTIES . . . .

dent V. H. Kellermeyer, a lean, methodical worker; gregarious Ben C. Smith, vice president; and R. J. Sandusky, enthusiastic golfer and fisherman as well as sanitary chemicals salesman—the organization is typical of many small companies built on little capital and much labor.

Lincoln registered sales of $1,500 its first year, continued to add products and customers gradually. Its line of sanitary chemicals for the janitor supply trade was expanded in 1947 by the addition of laundry specialties, including water repellents, sizes and detergents. The firm has been hoping for new quarters, and further growth resulting from the Linol products may make physical expansion necessary.

•

Final on Chlordane: The U.S. Supreme Court has just denied a petition by Julius Hyman & Co., Julius Hyman and others, for review of the judgment of the Colorado Supreme Court affirming with modifications a decree of the Denver District Court in the Hyman-Velsicol chlordane legal controversy (*CW, June 16*). This renders final that decree which, in part, enjoins Hyman & Co. and individual defendants, from making and selling various chemicals including the insecticide chlordane.

This decree also orders the company to pay Velsicol Corp. $1,663,000 on account of damages caused and gains and profits realized by Hyman from chlordane for the period ending March 31, 1949. All but about $300,000 is payable immediately; that sum represents income taxes paid by the Hyman company on profits in the fiscal years 1947-48 and 1948-49, and is payable provided a refund is obtained on those taxes. But Hyman had to post a $300,000 bond to insure its diligent efforts in seeking to recover the money.

•

Photo Chemicals: Brown-Forman Industries, a recently organized division of Brown-Forman Distillers Corp., Louisville, Ky., is marketing of a new print flattening solution, BFI No. 20, and a hypo neutralizer, BFI No. 30. The compounds were developed by members of the company's product development laboratories; their introduction marks the first Brown-Forman venture into photographic chemicals.

PICTURES IN THIS ISSUE:

Cover (top) & p. 15 (3)—Pennsylvania Salt Mfg. Co.; p. 16 (left)—USN-Dept. of Defense; p. 16 (right)—Wide World Photo; p. 27—Manny Warman, Columbia Univ.; p. 33—Dow Chemical Co.

PRODUCT CONTROL THROUGH INFRARED ANALYSIS

Number 4 *of a Series of Data Sheets for Better Process Control from The Perkin-Elmer Corporation, Manufacturers of Infrared Spectrometers, Flame Photometers and Electro-optical Instruments.*

PROBLEM:

Detection of gamma isomer for quality control of technical benzene hexachloride and lindane.

PLANT:

Hooker Electrochemical Company, Niagara Falls, N.Y.

SOLUTION:

Infrared analysis. For routine determinations, 2.0 g BHC is dissolved in 50 ml CS_2 and measured at the analytical wavelength for gamma. The working curve converts the optical density to the gamma content with accuracy of ±0.3% (Fig. 1). More elaborate procedures determine all five isomers in benzene hexachloride, or as little as 0.005% of any isomer other than gamma in lindane.

INSTRUMENTATION:

Standard Perkin-Elmer Spectrometer, Model 12-C, rock salt prism and cells.

DISCUSSION:

Of the five stereoisomers in BHC, only the gamma is an effective insecticide; hence, its proportion in BHC is essential for quality control. Routine infrared analysis takes 10 minutes; other methods take considerably longer. Hundreds of such control analyses are run every month by Hooker at a fraction of the cost by any other known method.

REFERENCE:

Ind. & Eng. Chem., Anal. Ed., 19, 779, 1947.

CONCLUSIONS:

Comparable analyses are in service on other Hooker products.

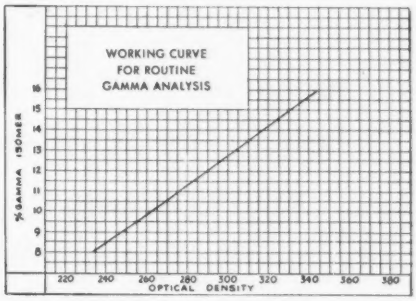

Fig. 1—Working curve yields gamma content from optical density.

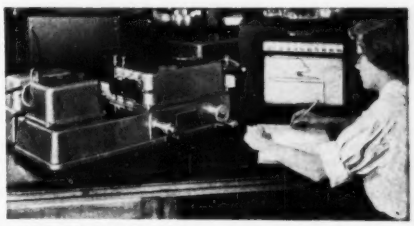

Fig. 2—Perkin-Elmer Spectrometer speeds product control at Hooker Electrochemical Co.

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BOOKS.....

Mathematics for Engineers, third edition, by Raymond Dull and Richard Dull. McGraw-Hill Publishing Co., Inc., New York, N.Y.; xix+822 pp., $7.50.

A reference book for engineers, this volume covers the various phases of mathematics—presented in the form an engineer might need. As a review of mathematics specifically intended for engineers, this book approaches the diverse mathematical subjects as a unit and not as individual topics—the usual textbook manner. Multiple graphical explanations and illustrative examples are included in discussing such topics as algebraic notation, determinants, differential calculus, curve analysis, etc. This revised edition contains new chapters on differential equations and dimensional analysis.

Organic Chemistry, by A. F. Holleman and revised by J. P. Wibaut. Elsevier Press, Inc., Houston, Texas; xiv+662 pp., $9.

In retaining the original character of Holleman's original work, this revised version treats the subject of organic chemistry from the physicochemical standpoint as well as the organic. Fundamental topics are discussed in relationship to relevant compounds rather than from an isolated point of view; thereby, the book is intended to give the student a better insight into the organization, problems and development of organic chemistry. Stereochemical aspects are covered as well as specialized topics of interest to medical and biochemical readers. For the latter group the author has stressed certain types of natural products such as sugars, starch, cellulose, proteins, terpenes, carotenoids, etc.; antibiotics including the penicillins as derivatives of thiazole are also noted.

MEETINGS..

Synthetic Organic Chem. Mfrs. Assn., annual meeting, Commodore Hotel, New York, N.Y., December 11.

Compressed Air & Gas Inst., The Drake, Chicago, Ill., December 11-12.

Chemical Market Research Assn., Du Pont Country Club and Du Pont Hotel, Wilmington, Del., December 13.

Soc. of the Plastics Industry, Inc., conf., Commodore Hotel, December 13-14.

Amer. Assn. for the Advancement of Science, annual meeting, Philadelphia, Pa., December 26-31.

Div. of Ind. and Engineering Chem., annual symposium, Evanston, Ill., December 27-28.

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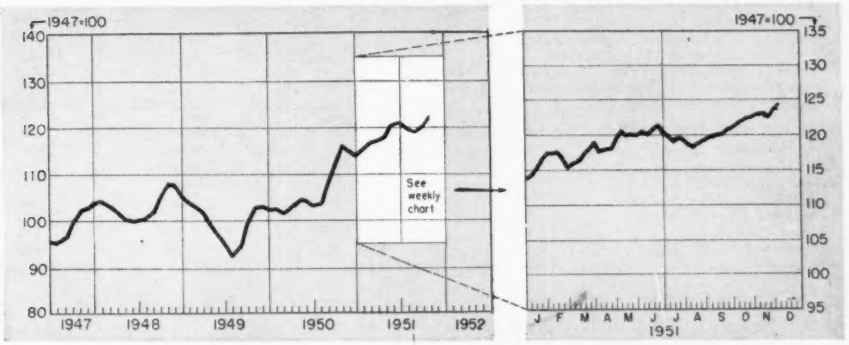
CHEMICAL MARKETS....



CW Index of Chemical Output—Basis: Total Man-Hours Worked in Selected Chemical Industries

Drying oils are slated to be scarcer next year. That is the consensus of Government and industry this week. Among the premium drying types, tung and castor are still in short supply. Tung oil, of course, used to come from China, but not now. Domestic castor output is increasing yearly, but this is offset by mounting defense demands for sebacic acid, made from castor oil.

Linseed oil, a large volume mainstay, will be 20% less abundant than last year. The price-conscious surface coatings industry finds itself switching gradually to cheaper and more abundant soybean oil.

New developments this week are causing the soap industry to perk up. These come on the heels of 15% increase in sales from the second to the third quarter this year. Prices of oils and fats have dropped considerably, and the price of caustic will almost surely drop as supplies keep getting more plentiful.

Growth of synthetic detergents may be slowed by lack of benzene. NPA pointed this out to an advisory committee in Washington. If Iranian imports of petroleum are cut off completely, benzene may have to be diverted from making detergents to production of aviation gasoline. But if this hurdle is passed, the next problem is the sulfuric shortage that has put a crimp in the plans of many another industry.

NPA had a surprise coming this week when the textile finishing advisory committee accepted the 90% limitation order without official demur. The industry, which uses only about 1% of the total sulfuric consumed, probably figured its voice couldn't be heard anyway.

But a survey now in progress on chemicals needed in textile finishing will give the industry solid ground for staking out future supply claims.

The U.S., through the RFC, will soon become an exporter of GR-S synthetic rubber. RFC, having received the O.K. of the Office of International Trade, will start shipping small quantities abroad in the first quarter of 1952. Foreign buyers will pay the same (26¢/lb.) as the domestic market.

Output of GR-S is on schedule and will be hitting an annual rate close to 850 thousand tons in about four months. However, a butadiene shortage may be the next bottleneck. For instance: The Kentucky Syn-

MARKET LETTER

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Industries Output Index (1947=100)	125.0	124.5	114.1
Bituminous Coal Production (Daily Average, 1000 Tons)	2,018.0	1,993.0	1,834.0
Steel Ingot Production (Thousand Tons)	2,071.0	2,079.0	1,938.0
Wholesale Prices—Chemicals and Allied Products (1926=100)	139.9	140.0	136.6
Stock Price Index of 14 Chemical Companies (Standard & Poor's Corp.)	224.7	222.7	196.0
Chemical construction awards	$36,819,000	$9,887,000	$42,430,000

MONTHLY BUSINESS INDICATORS—EMPLOYMENT (Thousands)	Latest Month	Preceding Month	Year Ago
All Manufacturing	12,983	13,070	13,133
Non-durable Goods	5,697	5,795	5,947
Chemicals and Allied Products	551	542	523
Paper and Allied Products	412	417	421
Rubber Products	212	218	219
Petroleum and Coal Products	199	197	190

thetic Rubber plant at Louisville operated about 15% under capacity last month for lack of butadiene.

For the second time in two weeks, NPA and the chemical industry find themselves at odds on what's short, what isn't. This week it's allethrin which NPA classifies as hard to get, while actually it's on the plentiful side. Last week resorcinol was similarly misclassified.

Despite some evidence to the contrary, OPS is letting up on many chemical manufacturers. Producers now have more flexibility in choosing their price system; and, if they know a tailor-made regulation is on the way, they are reprieved from filing under CPR-22.

For those who must file under CPR-22, OPS now allows them to use the January GCPR ceilings as a starting point for making cost adjustments. This is a happier choice for many who would be hamstrung by using a pre-Korea base period.

Those who could use more chlorine—and the number is legion—will be interested in the production time-table that NPA handed the wood pulp producers this week. Present output of 6.5 thousand tons daily will be boosted to 7.3 thousand tons a day by the year's end.

Robust expansion in 1952 will bring this figure to a little better than 9 thousand, and a further rise to 9.7 thousand tons a day is slated for the end of 1953.

At the end of this two-year program NPA sees the long hoped-for balance of supply and demand. Some in the industry think it will be even sooner.

A three-way exchange of views on paint materials took place in Washington this week between NPA, the paint industry technical committee, and the General Services Administration. Objective: to save on lead pigments and scarce synthetics.

The industry committee proposed using more titanium dioxide, less lead in government exterior paint "specs."

GSA indicates that the government may also change specs on three interior coatings which use alkyds. Saving: ½-1 pound of phthalic anhydride equivalent per gallon.

SELECTED CHEMICAL MARKET PRICE CHANGES — Week Ending December 3, 1951

	Change	New Price		Change	New Price
UP					
Linseed Oil, raw, tanks	$ .005	$ .21			
DOWN					
Casein, imp., acid ppd.	.005	.35	Carnauba Wax, No. 1 yel.	$ .02	$1.24

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Caustic A-Plenty

Major producer prepares to offset expected caustic price decline by seeking rise for chlorine.

Slump in rayon and soap industries makes caustic supplies ample now, and new facilities point to more abundance.

Shaving caustic prices would spur drive for foreign markets and sharpen use competition with soda ash.

A price decline for caustic may be close at hand. A leading producer of electrolytic chlorine-caustic is readying a price package for the Office of Price Stabilization. The objective: to get a price increase for chlorine in order to absorb a price cut on caustic.

This move is a cinch to win support of most electrolytic producers when the chips are down. For they are finding business less profitable because of mounting construction costs for new defense-needed capacity coupled with a letdown in some caustic-consuming industries.

Officially, neither OPS or NPA have heard about this proposal, although they probably expect it before long. OPS has the final say-so on price increases, and producers may have to present a strong case to get the OPS nod. But whether it says yes or no, the price of caustic is still headed downward. For caustic is the less-wanted of the two electrolytic products and its supply must follow the upswing in chlorine demand.

This expansion in electrolytic chlorine-caustic won't be complete until the tag-end of 1953. But the strategists who map caustic sales are concentrating on the problem now. Even at the present time, the supply of caustic is ample to meet the domestic demand. Reason: Needs of rayon and soap industries, major caustic consumers, are down because of a slump that started last summer.

It is this decline that brought the caustic supply problem home to producers sooner than many had expected. Of course, it is a good bet that these industries will regain much of the lost ground. For instance, soap sales in the third quarter were up 15% over the second quarter of 1951. And with the present low prices of oils and tallow, business should continue to climb.

More Outgoing: Yet even with the overdue pickup in domestic caustic demand, a glut will be forthcoming unless the export market takes more of the expanded output. Fortunately, countries overseas have been taking greater quantities of the U.S. product. Since March, some 50 million pounds a month have been sold for export. This is a 50% jump over the 1950 rate, and the rise continues.

But despite the huge export market potential, getting more foreign business is no order-taking proposition. Competition from the United Kingdom and Germany in these markets grows keener daily; and since price is the main persuader, the proposed change in the caustic-chlorine price structure would bolster U.S. producers where they are weakest.

Among other factors to consider are the widespread political unrest now, and the slow growth of caustic-making facilities abroad.

Basic Economics: In the coming buyer's market, caustic sales will be determined by where the price is pegged. Shrinking the $20 a ton differential between caustic and soda ash* will help caustic to move in on some ash markets. If that happens, caustic made from ash will become an economic casualty to the defense-spurred need for chlorine.

Beef on Tallow

Office of Price Stabilization last week made its first attempt to cudgel down ceiling prices by taking advantage of depressed market conditions.

It set, effective Dec. 4, a substantially lower ceiling price on natural glycerine. The top for the soap lye grade (80%) was set at 37¢ per pound, compared to about 50¢ previously. Saponification grade (88%) will sell for 40¾¢ maximum. Price for chemically pure (98%) glycerine will be 56¢ east of the Rockies and two cents more in the West. All prices remain on a freight prepaid basis.

In announcing the new ceilings, OPS asserts that the levels are high enough to cover any increases in production costs since before Korea when glycerine (soap lye grade) was selling

* Current prices: caustic, $50/ton; ash, $30/ton.

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near the 16¢ level. The January price freeze found this price at its 50¢ peak. Recently the price was 34¢, and has slowly been edging upward. OPS philosophy here is to prevent further increases.

With their close relationship to glycerine, soap and tallow apparently will be next to have their ceilings lowered.

Industry objection to such cuts was evidenced by the recent walkout, followed by resignation of seven of the nine-member tallow industry advisory committee. The members felt that their group had been asked only to rubber-stamp OPS plans for lower ceilings, and considered that no action was necesarry in view of the depressed market.

The next day, OPS mimeographed ground out copies of a statement that there was "no justification" in the committee grievance. However, the seven resignations were accepted—"with regret."

Market Ties: The close linkage of glycerine, soap, tallow and meat is a complicating factor in setting separate ceilings. In normal times, when meat demand increases and prices go up, packers can afford to sell their tallow for less. When this happens, soap prices can come down. Some manufacturers credit income from by-product glycerine sales against tallow costs. Thus when glycerine prices drop, net soap raw material costs rise.

Meat packers' profits have been squeezed between fixed prices and rising costs. Any relief would be slow in coming—farmers have more votes than meat packers.

In turn, soap manufacturers figure they must protect themselves on the cost of raw materials to prevent profit cuts. They naturally like a low ceiling on tallow prices and a high one on glycerine. Glycerine users, to protect their return, want a low ceiling on glycerine.

As it ends up, only sure winners are the farmers. OPS, in using this somewhat dubious method of keeping down prices, can't move without further alienating at least one of the three other major factions: packers, soap makers and glycerine users.

GOVERNMENT NEEDS

Bid Closing — Invitation No. — Quantity — Item

Officer in Charge, Navy Purchasing Office, Washington, D.C.:

Dec. 17 — 5617-O-B — 600,000 — Ethyl cellulose inhibiting tape, drawing 651347

Commanding General, New York Quartermaster Procurement Agency, 111 East 16th Street, New York, N.Y.:

Dec. 20 — 52-643B — 2,393 rls — Moisture barrier, vapor-proof, flexible, type I, Class B

General Services Ad., 1114 Commerce St., Dallas, Texas:

Dec. 11 — FW-19033 — 12,000 gal — Soap, liquid, toilet, P-S-618A
20,160 lb — Soap, powder, P-S-606A and Amendment 4

Chicago Chemical Procurement District, Room 902, 226 West Jackson Blvd., Chicago, Ill.:

Dec. 11 — (CML-11-021-52-21B) — 1,285,752 lbs — Paraffin, chlorinated, to be packaged in 16 gauge phenolic lined steel drums

Officer in Charge, Navy Purchasing Office, Washington, D.C.:

Dec. 13 — 2279Q — 25,000 ft — Rods, round, nylon-FM 10001

Purchasing Branch, Letterkenny Ordnance Depot, Chambersburg, Pennsylvania:

Dec. 11 — 52-43 B — 30,000 rl — Tape, adhesive, pressure, sensitive, water resistant, color, blue grey with one ½" yellow strip

Chief, Procurement Division, Supply Service, Veterans Administration, Washington 25, D.C.:

Dec. 10 — A-34 — 288 btl — Chloral hydrate, ¼ lb
264 btl — Chloral hydrate, 1 lb
1,200 bx — Histamine phosphate injection

General Services Administration, Public Assistance Office, Room 528, U.S. Court House, Chicago 4, Ill.:

Dec. 12 — CH-35658 — 2,125 gal — Wax, emulsion

GOVERNMENT AWARDS

Item	Supplier	Location
Aviation Supply Office, 700 Robbins Avenue, Philadelphia 11, Pa.:		
Pigment: zinc oxide	American Zinc Sales Co.	Columbus, Ohio
Ethyl acetate	Amer. Resinous Chemicals Corp.	Peabody, Mass.
Oiticica oil	Brazil Oiticica, Inc.	New York, N.Y.
Ethyl acetate	Glove Solvents Co., Inc.	Philadelphia, Pa.

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1—Ingersoll Rand Bronze Centrifugal Motorpump #2-MRV-20, 175 GPM @ 260', 20 HP motor.
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Additional Auction Advertisement on Page 38, Reclaimed & Surplus Chemicals page 45.

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Advertisements:—There is a page number on the coupon for each advertisement. Before the number, may appear, L, R, T, B (left, right, top, bottom), locating the ad on the page; small letters following (a,b,c) indicate additional products in the advertisement.

Editorial Items:—Numerals are page numbers; the ABC's distinguish among items where more than one is on a page. There is a number on the coupon for each item referring to new products, equipment, and literature.

EDITORIAL ITEMS

For more data, circle number on coupon.

TECHNICAL LITERATURE

CHEMICALS

Absorption Bases 48C
Anti-Rust Paint 48D
Casein Products 48B
Hydraulic Fluid 48A
Silicone Base 48E

EQUIPMENT

Air-Raid Siren Control 48M
Ball, Tube and Rod Mills 48G
Brazing Materials 48J
Noise Elimination 48L
Pressure Reaction Apparatus 48I
Process Equipment 48F
Steel Tubing 48K
Thermocouple Wells 48H

GENERAL

Accident Report 48N

NEW PRODUCTS

Decontaminating Agent 21A
Organic Chemicals 22A

NEW EQUIPMENT

Lead-Clad Copper 31C
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Expires March 8, 1952

BOOKLETS . . . .

Chemicals

Hydraulic Fluid

20-p. booklet devoted to "Skydrol," a synthetic nonflammable type hydraulic fluid, giving technical information on its general properties in addition to evaluation data such as lubricity test results, resistance to ignition and typical pump wear details; its performance in aircraft installations is also discussed. Monsanto Chemical Co.

Casein Products

3-p. bulletin describes specially developed casein products to be used in leather finishing in order to obtain various types of finish—weather-resistant, pliable, hard firm or others. Chemical Div., Borden Co.

Absorption Bases

8-p. booklet discussing cosmetic cream compositions which can be prepared from absorption bases, in regard to their formulations, advantages and methods of preparation. Innis Speiden & Co., Inc.

Anti-Rust Paint

Bulletin describing paint which acts as an anti-rust agent by sealing rusted surfaces and retarding further rusting action; can be applied on rusted surfaces without wire-brushing, scraping or sandblasting. The Monroe Co., Inc.

Silicone Base

Bulletin describing "Monoseal," a silicone base intended to keep water out of masonry walls by means of penetrating into the surface and silicone coating the pore walls. Details are given on application methods and results obtained from its use. The Monroe Co., Inc.

Equipment

Process Equipment

24-p. booklet discussing the construction, operation, performance, advantages, application and general features of the firm's line of dryers, evaporators, filters, gasholders, mixing devices and sedimentation equipment; additional sections deal with conservation structures, custom fabrication and transportation details. General American Transportation Corp.

Ball, Tube and Rod Mills

28-p. catalog entitled, "Continuous Grinding," discussing design features, operating principles and applications of ball, tube and rod mills, mills which run on the continuous principle. Technical information is amplified by charts which show size, weight, linings, ball charge, speed, power requirements and motor sizes for mills. Described also are accessory equipment and the complete grinding systems. The Patterson Foundry & Machine Co.

Thermocouple Wells

28-p. catalog presenting technical information plus charted curves as an aid in the selection of the proper thermocouple well for any given application or for specific temperatures or pressures that may be involved; this selection data takes into consideration the two vital factors—the material of construction and the physical dimensions of the well. Included are photographs and dimensional drawings of the firm's line of standard wells. Minneapolis-Honeywell Regulator Co.

Pressure Reaction Apparatus

6-p. folder discussing the purpose, applications, specifications, and parts and accessories for pressure reaction apparatus with motor driven stirrer for hydrogenation, alkylation, hydrolysis, polymerization and other chemical pressure reactions on a laboratory scale, for operation at pressures and temperatures from atmospheric to 1000 psig at 350 C. Parr Instrument Co.

Brazing Materials

4-p. folder discussing "Braze-Clad metals," clad metal combinations of various base metals, ferrous and nonferrous, clad with a wide range of silver brazing alloys. These metals finds application in joining practices in metal-working plants; typical applications are illustrated and described. American Silver Co., Inc.

Steel Tubing

Chart covering the range of sizes which the firm produces in electrical resistance welded carbon steel tubing used for either mechanical or pressure purposes. Babcock & Wilcox Tube Co.

Noise Elimination

Pamphlet discussing the problems of industrial noises and their control in industries ranging from manufacturing and power plants to aviation factories. Equipment in question as noise causers were compressors, diesel engines, generators, jet engines, etc. Industrial Acoustics Co.

Air-Raid Siren Control

Bulletin featuring mercury plunger relay as a power relay control hook-up for 2 hp siren, which may be actuated by remote control from signal center or directly at location. H-B Instrument Co.

General

Accident Report

22-p. report presenting a statistical analysis of 1674 vertical transportation accidents (elevators, moving stairways, automatic elevators and dumbwaiters) that occurred in 1949 and 1950, points up the conclusion that many of the serious or fatal accidents could have been prevented by adequate safety devices. The analysis brings to attention representative types and causes of accidents as well as those conditions needing attention. Otis Elevator Co.

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Case History #23

Or the Obnoxious Catalyst and How It Was Made

A HYDROGENATION catalyst presented many difficulties to a chemical manufacturer who was producing the catalyst for their own use. It was hazardous and costly to produce . . . valuable space and equipment needed for regular plant production was being monopolized.

Having heard of the confidential and dependable manner in which Davison produced specialty catalysts this company turned to Davison's Field Service Engineers for help. Davison Research then took over and soon the catalyst was being turned out by a pilot plant operation. Then an initial plant run was made.

Not only did Davison's experience and modern facilities produce the catalyst at a reduced cost but the efficiency of the catalyst was also increased. The production of this hydrogenation catalyst by Davison know-how eliminated the dangerous plant problem and enabled the chemical manufacturer to utilize valuable space formerly used to manufacture the catalyst.

If you have a catalyst problem, why don't you contact the Davison Field Service Engineer or the Technical Service Department and put Davison Research to work for you.

Progress through Chemistry

THE DAVISON CHEMICAL CORPORATION

Baltimore 3, Maryland

PRODUCERS OF: CATALYSTS, INORGANIC ACIDS, SUPERPHOSPHATES, PHOSPHATE ROCK, SILICA GELS, SILICOFLUORIDES AND FERTILIZERS

Tomorrow's Basic Chemicals-TODAY!
Many New Products Due Thru Use of Fluorine Chemicals
New Lubricants, Plastics, Solvents, Dyes, Other Materials in Offing
GENERAL CHEMICAL FLUORINE COMPOUNDS

Vital today in many fields . . . indispensable to tomorrow's key developments in chemical processing, Fluorine Compounds are rapidly gaining a place as Industry's most versatile group of basic chemicals.

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Anticipating Industry's expanding needs for fluorine compounds, General Chemical has conducted an extensive fluorine research program for more than two decades. With its basic position in Hydrofluoric Acid and Elemental Fluorine—and in the raw materials from which they are made—General is geared to produce virtually any fluorine chemical that Industry might require. Today, it offers over sixty-five such products. Many more are under development as commercial chemicals or as custom-made specialties.

If organic or inorganic fluorine compounds are indicated in your present or projected operations, consult with General Chemical first. You will find the broad experience of our fluorine specialists helpful to you from product inception to full-scale production.

GENERAL CHEMICAL DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

Offices in Principal Cities from Coast to Coast

BASIC CHEMICALS

...FIRST IN FLUORIDES

FOR AMERICAN INDUSTRY

GENERAL CHEMICAL FLUORINE COMPOUNDS*

ACIDS

Fluoboric Acid
Fluosulfonic Acid
Hydrofluoric Acid
Hydrofluoric Acid, Anhy.
Hydrofluoric Acid, Anhy. (High purity grade)

ACID FLUORIDES

Ammonium Bifluoride
Potassium Bifluoride
Potassium Polyacid Fluoride "50"
Sodium Bifluoride

ALKALI FLUOBORATES

Ammonium Fluoborate
Potassium Fluoborate
Sodium Fluoborate

ALKALI FLUORIDES

Ammonium Fluoride
Potassium Fluoride
Sodium Fluoride

DOUBLE FLUORIDES

Potassium Aluminum Fluoride
Potassium Chromium Fluoride
Potassium Ferric Fluoride
Potassium Titanium Fluoride
Potassium Zirconium Fluoride

METAL FLUORIDES

Aluminum Fluoride, Crystal
Antimony Trifluoride
Antimony Pentafluoride
Barium Fluoride
Cadmium Fluoride
Calcium Fluoride
Chromium Fluoride
Cobalt Trifluoride
Copper Fluoride
Ferric Fluoride
Lead Fluoride
Magnesium Fluoride
Molybdenum Hexafluoride
Nickel Fluoride
Strontium Fluoride
Titanium Tetrafluoride
Tungsten Hexafluoride
Zinc Fluoride
Zirconium Tetrafluoride

METAL FLUOBORATE SOLUTIONS

Cadmium Fluoborate
Chromium Fluoborate
Cobalt Fluoborate
Copper Fluoborate
Ferrous Fluoborate
Indium Fluoborate
Lead Fluoborate
Nickel Fluoborate
Silver Fluoborate
Stannous (Tin) Fluoborate

NON-METAL FLUORIDES

Boron Fluoride Gas
Boron Fluoride–Diethyl Ether Complex
Boron Fluoride–Phenol Complex
Boron Fluoride–Other Complexes
Sulfur Hexafluoride

HALOGEN FLUORIDES

Bromine Trifluoride
Chlorine Trifluoride
Iodine Pentafluoride

ORGANIC FLUORINE COMPOUNDS

Genetron® 100—$CH_3 \cdot CHF_2$
Genetron 101—$CH_3 \cdot CClF_2$
Genetron 131—$CCl_3 \cdot CClF_2$
Genetron 150—$CH_2 = CF_2$
Genetron 160—$CHCl = CF_2$
Genetron 170—$CCl_2 = CF_2$
Genetron 265—$CClF = CF_2$

The products listed include those which are commercially available as well as a few presently produced only in experimental quantities. For further information on any of these, or on other fluorine compounds you may require, consult the General Chemical Product Development Department.